

AUTOMOTIVE INDUSTRIES

A C H I L T O N P U B L I C A T I O N

AUGUST 15, 1960

Features ●●●

**KEYS TO BUYING
AT THE BUDD COMPANY**

**CRANKSHAFTS CAST
IN AUTOMATIC SETUP**

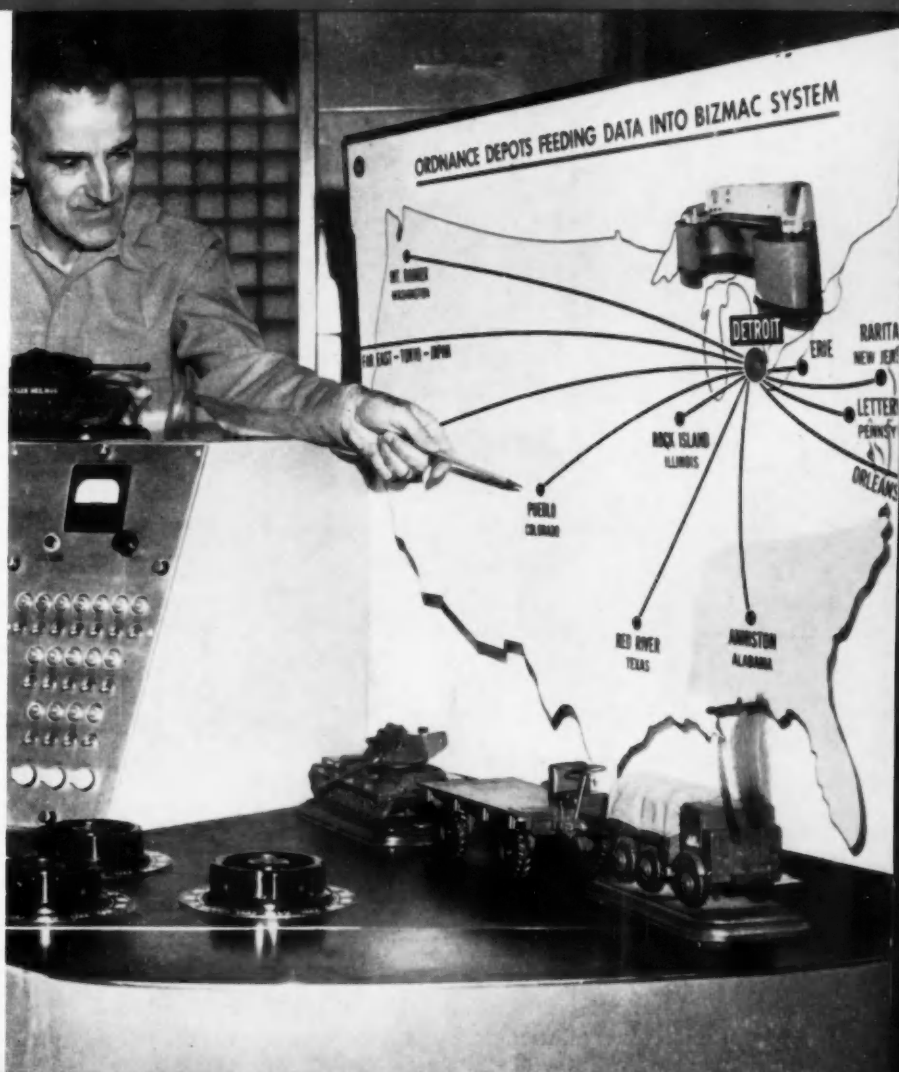
**SILENCING METHODS
AT ROVER PLANT**

**INDUCTION HARDENED
TRUCK AXLE SHAFTS**

Automated Shipping

Col. David W. Hiester,
Army Ordnance Tank and
Automotive Command,
points to computer console
of electronic network

PAGE 64

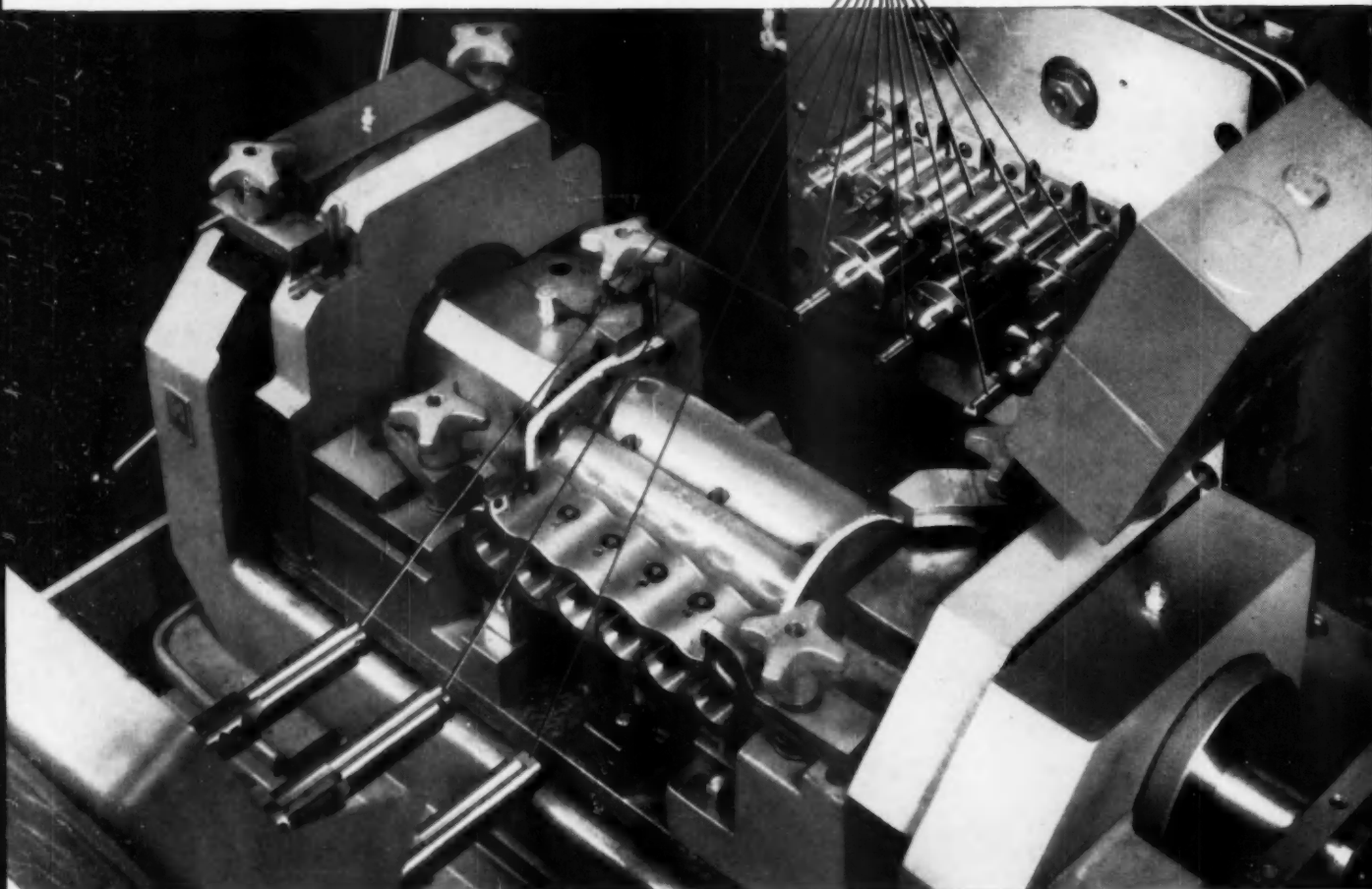


**ENGINEERING
MANAGEMENT • PRODUCTION
DESIGN**



12 HEADS

are better than one



Heald Bore-Matic finishes up to 27 DIFFERENT SURFACES at a single loading

• In the setup shown above, 27 surfaces of 15 bores are done on one machine at a single loading—a Heald Model 222 Bore-Matic with Multi-Spindle heads with a trunnion type fixture. Six deep 3-step bores are done with the three left-hand heads with only one index of the cross slide. After indexing the fixture to hold the work vertical, nine right-angle bores are done at a single pass with the right-hand heads. The same machine also handles four-barrel pump hous-

ings, simply by removing one of the left-hand spindles and three of the right-hand spindles.

On multiple-hole Boring jobs such as this, interchangeable Multi-Spindle Red-Head boringheads permit many operations to be combined on a single machine, with minimum indexing of the work and positive spacing between bores. Your Heald engineer will be glad to give you complete information.

It PAYS to come to Heald



THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse
Circle 101 on Inquiry Card for more data



KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Thermal Stress-Relieving of Alloy Steels

In the production of alloy steel bars and parts made of alloy steel, stresses are sometimes set up, and these stresses must be relieved before optimum results can be expected. Two general types of stress-relieving are practiced—thermal and mechanical. In this discussion we shall consider only the former.

There are several important reasons for thermal stress-relieving. Among these are the following:

(1) The first and most fundamental purpose is to reduce residual stresses that might prove harmful in actual service. In the production of quenched and tempered alloy steel bars, machine-straightening is necessary. This induces residual stresses in varying degrees. Bars are usually stress-relieved after the straightening operation. When the bars are subjected to later processing that sets up additional stresses, subsequent stress-relieving may be necessary.

(2) A second major purpose of thermal stress-relieving is to improve the dimensional stability of parts requiring close tolerances. For example, in rough-machining, residual stresses are sometimes introduced, and these should be relieved if dimensional stability is to be assured during the finish-machining.

(3) Thermal stress-relieving is also recommended as a means of restoring mechanical properties (especially ductility) after certain types of cold-working. Moreover, it is required by the "safe-welding" grades of alloy steels after a welding operation has been completed.

Alloy bars are commonly stress-relieved in furnaces. Temperatures under the transformation range are employed, and they are usually in

the area from 850 deg to 1200 deg F. The amount of time required in the furnace will vary, being influenced by grade of steel, magnitude of residual stresses caused by prior processing, and mass effect of steel being heated. After the bars have been removed from the furnace, they are allowed to cool in still air to room temperature.

In the case of quenched and tempered alloy bars, the stress-relieving temperature should be about 100 deg F less than the tempering temperature. Should the stress-relieving temperature exceed the tempering temperature, the mechanical properties will be altered.

Items other than bars (parts, for example) can be wholly or selectively stress-relieved. If the furnace method is used, the entire piece is of course subjected to the heat; selective relieving is impossible. However, if a liquid salt bath or induction heating is used, the piece can be given overall relief or selective relief, whichever is desired.

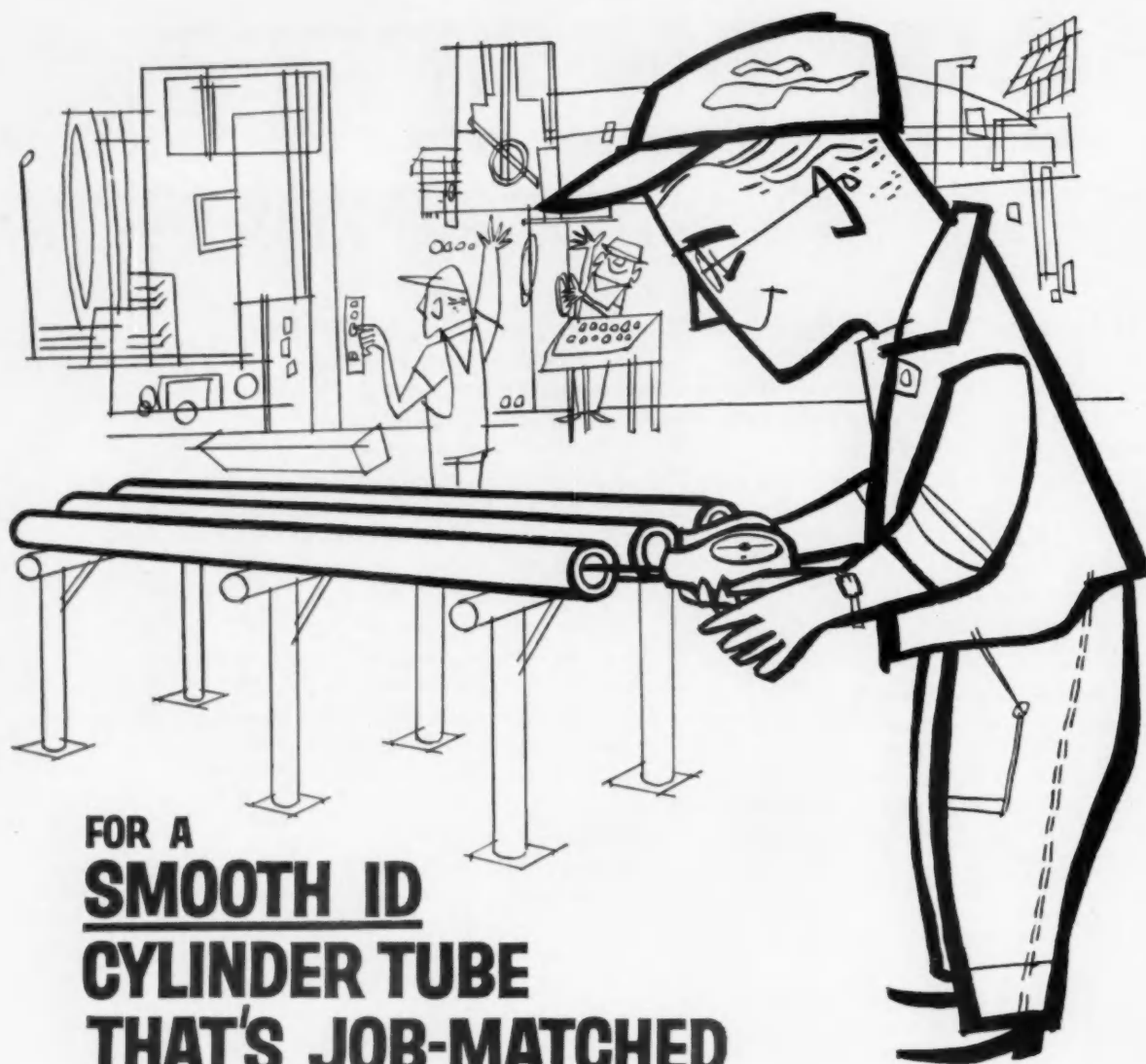
Detailed information about stress-relieving is available through Bethlehem's technical staff. And remember that we can furnish the entire range of AISI standard alloy steels, as well as all carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL





**FOR A
SMOOTH ID
CYLINDER TUBE
THAT'S JOB-MATCHED
SPECIFY**

B&W Lectrosonic steel cylinder tubing

With B&W LECTROSONIC you get . . .

- guaranteed maximum micro-inch finish on the ID to meet cylinder tubing requirements
- uniformity of wall thicknesses and close ID tolerances
- guaranteed physical properties to insure adequate strength
- tough, lightweight electric-resistance-welded cylinder

tubing that costs less than seamless in comparable sizes. Manufactured under a rigid system of quality control B&W LECTROSONIC Cylinder Tubing is a sound, uniform tube which will fabricate easily and give optimum service life. For more information, call your local B&W District Sales Office, or write for Bulletin T-459. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.



TA-9032-WM

B&W

SEE OUR EXHIBIT
Steel Area
1960 METAL SHOW
PHILADELPHIA
OCT 17-21
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**THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION**

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

AUGUST 15, 1960

VOL. 123 No. 4

Passenger Cars • Trucks • Buses • Aircraft • Tractors
• Engines • Bodies • Trailers • Road Machinery •
Farm Machinery • Parts and Components • Accessories
• Production and Processing Equipment •
Design • Production • Engineering • Management

Features • • •

▼ Keys to Buying at the Budd Company

The eight points which are most important in selling to the Hunting Park Plant of the Budd Company summarize the major factors which will help to establish good buyer-seller relationship. The subject is discussed in a four-page article. Page 61

▼ Arma Steel Crankshafts Cast in Automatic Setup

The Central Foundry Division of General Motors Corp. has fully-automatic molding machines to form the molds for cast crankshafts. Page 65

▼ Assembling the Corvair

Assembly techniques for the Corvair differ from conventional methods because of such features as rear-mounted, air-cooled engine, and integral body-and-frame. Page 66

▼ Marine Engine Sales Increase

Manufacturers of marine engines report that back orders and inquiry activity are up as compared to a year ago. Page 70

▼ New LeTourneau-Westinghouse Equipment

LeTourneau-Westinghouse is extending the productivity and flexibility of its equipment by marketing special attachments of other manufacturers. Page 72

▼ East Germans Link Presses for Automatic Line

The East German machine tool industry is placing increased emphasis on linking standard machines as a low-cost approach to automation. Page 74

▼ Silencing Techniques at Rover Plant

The unitized body construction of the Rover three-liter sedan calls for special silencing methods. These techniques are described in an illustrated article. Page 76

▼ Induction Hardened Axle Shafts

Axle shafts are induction hardened at the Fort Wayne Works of International Harvester Co. by a method which eliminates the need for straightening. Page 79

▼ Versatile Test Stands at Buick

All engines at the Buick Motor Division, Flint, Mich., are given a hot test and balanced on special time-saving test stands. Page 80

▼ New Testing Method for Vehicles

Measurements of strain, vibration, temperature, etc., are transmitted from a moving car to a receiving station. This new technique is in operation in a plant at Coventry, England. Page 82

▼ 21 New Product Items and Other Features Such as:

Machinery News; Manufacturer's News; and Industry Statistics.

... continued on next page



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Business Publications
Audit of Circulation

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time

for a "creative analysis"
of your circuit
termination program . . .

That's what C A is all about—time, your time . . .
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to send for our brochure on C A.



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"Quality Control Package" is the term we use to describe our method of designing, manufacturing, and servicing air tools. Too, we think this term best describes what Cleco offers you. Outstanding tools, engineering assistance, and service directed towards helping you increase the quality of your products with greater speed and economy.

Built-in quality is a vital part of the Cleco "Quality Control Package." Cleco air tool designs are never finalized until their value has been proved on customer operations. In the production phase, our roving specialists perform 100% surprise inspections at all critical points. Each and every completed tool is tested in a sound-proof room . . . checked against engineering specifications for power, air consumption, and speed. Appearance, too. **From Cleco® you get quality all the way.**



"quality tools engineered for industrial progress"

A Division of REED ROLLER BIT COMPANY • P. O. BOX 2119 • HOUSTON 1, TEXAS, U.S.A.

IN CANADA: Cleco Pneumatic Tool Company of Canada, Ltd., 927 Millwood Road, Leaside (Toronto), Ontario

New Aluminum Precote Process Insures Positive Gasket Performance

Exclusive Victor Aluminum Precote speeds heat transfer . . . provides higher temperature resistance . . . compensates for irregularities of mating surfaces . . . eliminates need of supplementary gasket cement

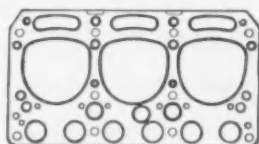
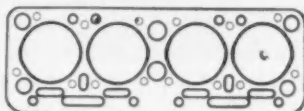
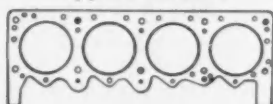
This newly developed Aluminum Precote provides simplified gasket installation and insures positive performance on high-temperature engine applications.

Deficiencies in earlier gaskets of this type have been completely eliminated by a new and thoroughly tested aluminum pigmented organic coating, and by refinement of the application method.

New Advantages

- The new processing method permits application of coating to finished gaskets, ready for shipment when coated, thus eliminating possible handling damage.

Available Gasket Types and Uses



Improved Aluminum Precote is performing successfully on beaded steel, metal-and-asbestos, metal core, and other gaskets suitable for engine head, manifold, transmission, and similar high-temperature, heavy-duty installations.

- Improved coating formula and new application method permit a heavier and completely uniform film on both gasket faces, in controlled thickness from .00075 to .0015 in.

- Controlled baking of coated gaskets at 400 deg. F. gives notably increased resistance to high working temperatures. Precote adhesion to gasket surfaces is improved.

- Resistance to gasket corrosion on contact with antifreeze and coolants is greater—with reduced possibility of blow-by between combustion chamber openings of gaskets.

- The new, higher-heat-converted Aluminum Precote remains soft enough to permit conformance of gasket to mating surface irregularities of engine head, block, flange faces, etc. At the same time new Aluminum Precote has improved properties for easy removal of gaskets.

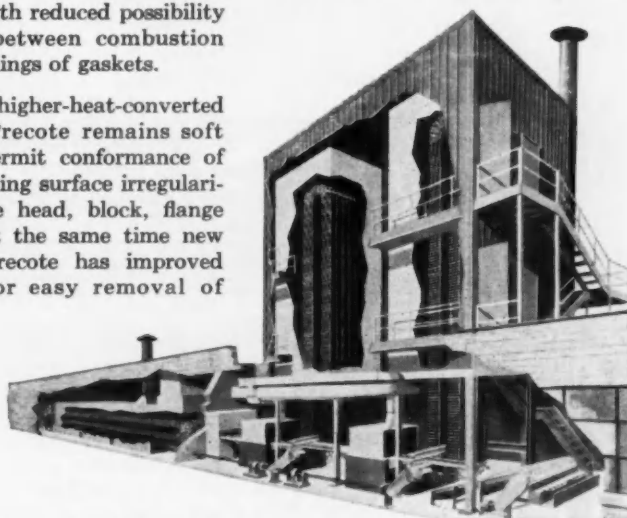
For your test purposes Victor will apply—at no charge—this new Aluminum Precote to two or more pieces on any Victor head gasket you are currently using. This serv-

**SAMPLES
FREE...
ON YOUR
OWN
GASKETS**

ice—or your inquiry for complete technical data and prices—involves no obligation. Handle through your Victor Field Engineer or direct with the factory. See address below.

New and Improved Facilities Allow High-Capacity Production

Three stories tall, and based on automated conveyor system operation, this Victor installation chemically prepares incoming gaskets, applies and bakes-on Aluminum Precote in



one continuous pass. This exclusive system improves the product and gives Victor much-enlarged production capacity.

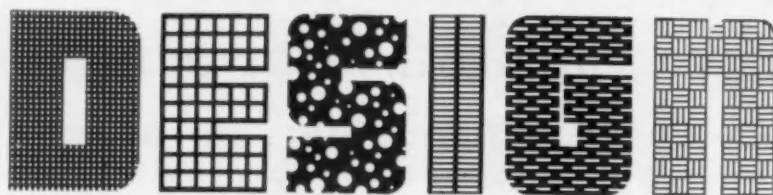
Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill. Canadian Plant: St. Thomas, Ontario.

VICTOR GASKETS

World's leader in gasket design and development
for automotive and industrial application

H&K perforated materials

a perfect medium of



with functional or decorative uses

Harrington & King can perforate the proper design, pattern and open area in practically any metallic or non-metallic material available in coils, sheets or plates—from foil-thin to 1" thick. Specify H&K perforated materials on your next job.

Write for General Catalog No. 75, Today!

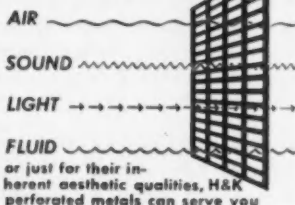
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Chicago 44, Illinois

New York Office and Warehouse
106 Liberty Street
New York, New York

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Wherever a product requires the passage or control of



or just for their inherent aesthetic qualities, H&K perforated metals can serve you



CALENDAR

OF COMING SHOWS AND MEETINGS

Western Electronic Show and Convention, Los Angeles.....Aug. 23-26

International Heat Transfer Conference, sponsored by ASME, American Society of Chemical Engineers, and IME, ICE (British).....Aug. 28 to Sept. 1

American Machine Tool Dist. Assn. Annual Meeting, Chicago...Sept. 3-4

Machine Tool Exposition — 1960 (sponsored by National Machine Tool Builders Assn.), Chicago Sept. 6-16

Production Engineering Show, ChicagoSept. 6-16

Joint Automatic Control Conference, Boston, Mass.....Sept. 7-9

ASME Engineering Management Conference, Cambridge, Mass. Sept. 7-9

2nd Coliseum Machinery Show, ChicagoSept. 7-15

Fall Meeting, Material Handling Institute, Virginia Beach, Va. Sept. 12-13

SAE National Farm, Construction and Industrial Machinery Meeting, MilwaukeeSept. 12-15

Steel Founders' Society of America Fall Meeting, Hot Springs, Va. Sept. 18-20

AWS National Fall Meeting, PittsburghSept. 26-30

ISA, Fall Instrument-Automation Conf. & 15th Annual Meeting, NYCSept. 26-30

ASME, Rubber & Plastics Confer., Erie, Pa.Oct. 9-12

SAE, National Aeronautic Meeting, Los AngelesOct. 10-14

Cast Bronze Bearing Institute, 1960 Annual Meeting, Asheville, N. C. Oct. 12

Magnesium Association Annual Convention, ClevelandOct. 17-18

42nd National Metal Exposition and Congress, PhiladelphiaOct. 17-21

Metal Show, Philadelphia.....Oct. 17-21

SPI, "Tooling for the Plastics Industry," New York City.....Oct. 19

1960 Fleet Maintenance Exposition, New York City.....Oct. 24-27

15th Annual Technical Exposition, American Society of Body Engineers, DetroitOct. 26-28

Material Handling Institute Show, Louisville, Ky.Nov. 1-3

ASTME, Western Tool Show, Los AngelesNov. 14-19

Automotive Electric Association, 43rd Annual Meeting and 24th Annual Mfg.-Dist. Conference, ChicagoDec. 2-9

SAE, International Congress and Exposition, Chicago.....Jan. 9-13, '61

Job-Designed Rivets for Every Industry



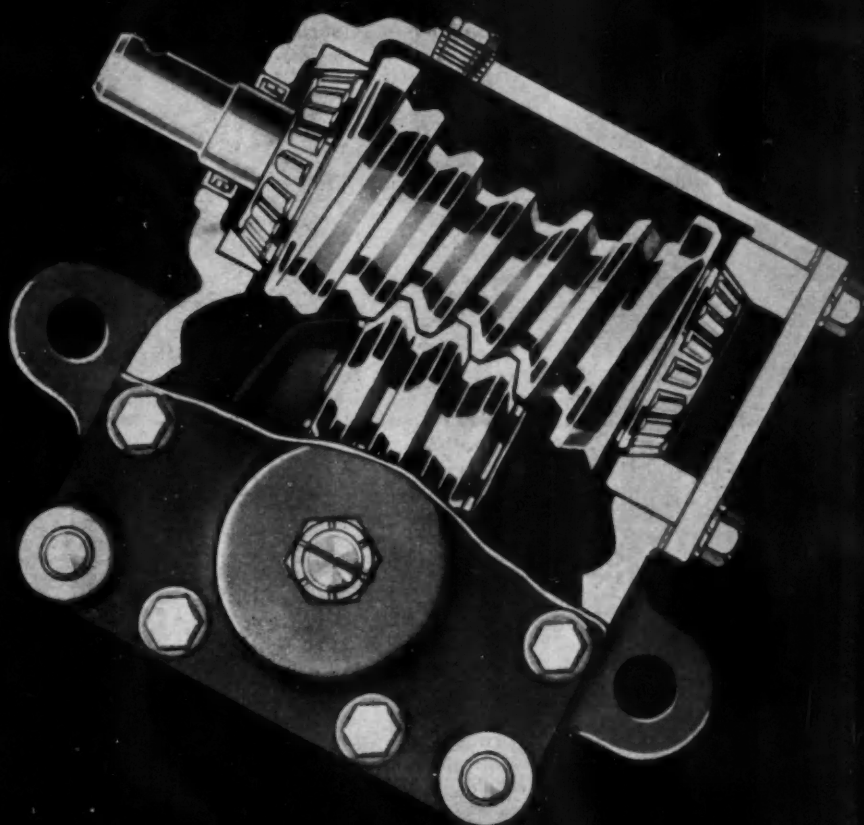
Here is a fast, dependable, low cost, quality minded source of supply for JOB-DESIGNED fasteners of all types, in any metal, to fit your own assembly problem. Assembly costs are a very major part of manufacturing expense. Most of this is labor. The fastening medium itself is usually a minimum item. If a Job-Designed fastener makes assembly simpler and faster, permits the use of fewer fasteners, allows the designer functional freedom and improves product efficiency, yours is a specifying job well done. All these

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Send for a copy of our latest catalog.

JOHN HASSALL, INC.
MANUFACTURERS SINCE 1850
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SMOOTHER STEERED WHEN GEMMER GEARED

Gemmer steering is engineered for strength and ease of operation . . . built for lifetime service and minimum maintenance. Customer pleasing features of the 7D gear are:

Compactness . . . High numerical ratio of 28:1 . . . An efficient, rugged gear . . . Simplicity of installation and adjustment . . .

Available in either malleable or aluminum housings

For your steering needs, Gemmer offers you experience as old as the industry.

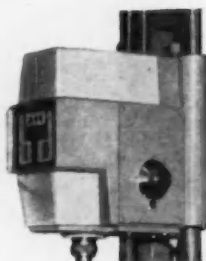
Gemmer steering
SINCE 1906

GEMMER MANUFACTURING COMPANY, Detroit, Michigan • Division of Ross Gear & Tool Company, Inc.

Here's Why Accurate Honing Is Easier On The New Barnesdril Model 244...



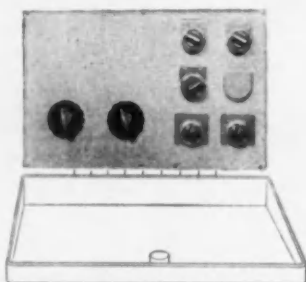
Hone Feed — simple dial gives infinite adjustment.



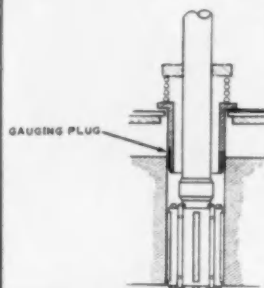
4-Speeds — turn of knob selects desired speed rate.



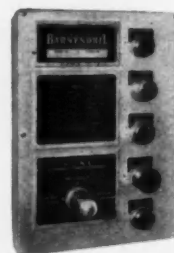
Reciprocation — length of stroke selected by convenient dial.



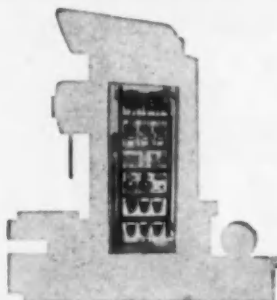
Set-Up — controls under lock and key.



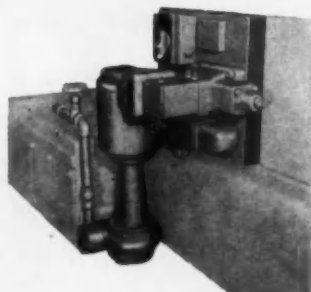
Plugmatic — automatic sizing assures accuracy within .0002".



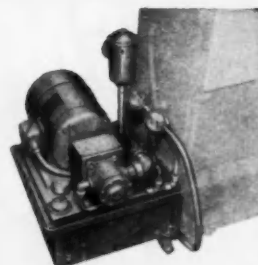
Operating Controls — mounted at shoulder height.



All Electric Controls — enclosed inside machine column.

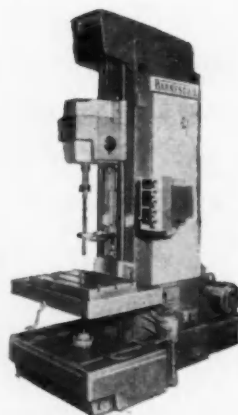


Coolant Pump and Hydraulic Valves — easily accessible.



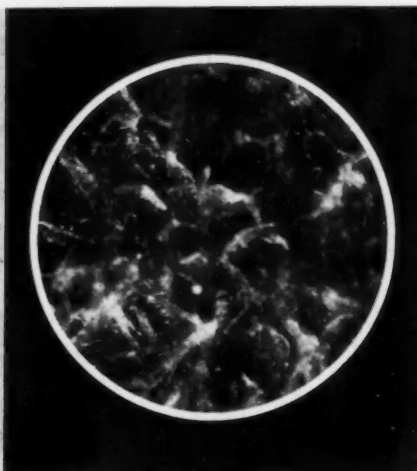
Hydraulic Pump — in open, for easy maintenance.

Barnesdril offers a completely new honing machine for high production honing of bores $\frac{1}{2}$ " to 6" in diameter. Large diameter applications depend upon amount of stock removal, bore length, and material. Machine is available with one or two spindles and a choice of three stroke lengths: 15", 25", or 40". For complete details see your Barnesdril representative or write for new bulletin H-112 today!

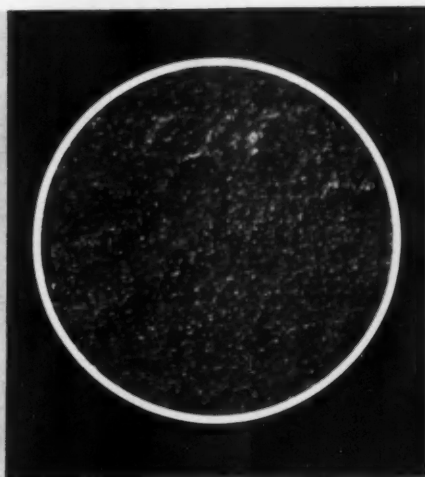


BARNES DRILL CO.
850 CHESTNUT STREET • ROCKFORD, ILLINOIS
DETROIT OFFICE: 13121 Puritan Avenue

Photomicrograph, 300x magnification, shows coating structure produced by conventional phosphating treatment.



Fine-grained coating, shown in photomicrograph at 300x magnification, produced on steel by Bonderite 890.

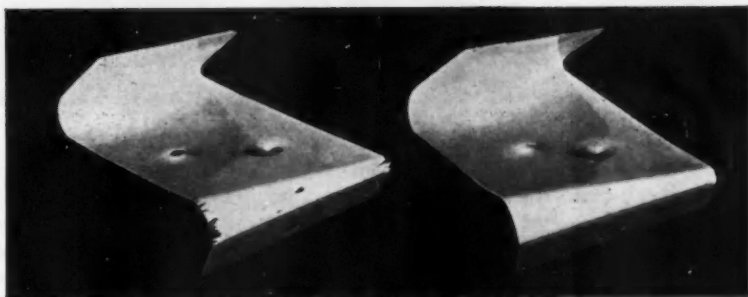


Finer Parker phosphate coating improves adhesion of new "hard" paints

Here is a Bonderite developed to meet the exacting requirements of the new "hard" paints—the epon and acrylic finishes so popular with manufacturers and their customers.

Bonderite 890 forms a micro-crystalline coating on steel. It is so finely crystalline that it is commonly referred to in industry as amorphous. The coating withstands an extraordinary amount of flexing of the metal underneath, with little shearing or dusting even under severe bending or denting.

Finishes applied over Bonderite 890's fine grained coating gain greater adherence and flexibility. Epons and acrylics withstand deformation without signs of failure.



Steel panels, finished with an acrylic enamel and bent on a conical mandrel. Unretouched photos show paint flaking over conventional phosphate treatment (left), and excellent paint retention over Bonderite 890 (right).

FINE RESULTS

AFTER HEAVY-DUTY CLEANERS

Regardless of the cleaning method used, Bonderite 890 coatings are uniformly hard and dense. This removes all restrictions on the utilization of medium and heavy-duty alkaline cleaners to handle heavy dirt, grease and soil. You get high quality paint

base coatings after any type of cleaner, when you use this specially developed Bonderite.

WANT MORE INFORMATION?

The Parker representative near you can give you details on Bonderite 890 and the benefits it may bring to your plant and your production. Call him in, or write Parker, Detroit.

Parker Rust Proof Company
2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.



Now—a tire that ends roadblocks in vehicle design!



Photo courtesy United Fruit Company, Boston, Mass.

Bringing bananas out of remote tropical groves used to be a costly, time-consuming job until the unique vehicle above was developed. Secret of this carrier's amazing mobility is the Terra-Tire—barrel-shaped, low-pressure pneumatic tire by Goodyear. Virtually punctureproof, these axle-driven and axle-loaded tires conform to the ground contour rather than resist it. Result: they can traverse bumpy terrains with less jostling than other

methods. Even loose sand and soil present no problem for the Terra-Tire. This makes them ideal for banana haulage. They don't need roads. They can roll right into backwoods areas. And the ride is so cushion-soft that the bananas aren't even bruised! These are just a few of the Terra-Tire advantages that are prompting unusual interest—and wide application—by design engineers.

Terra-Tire—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



Perfect for oil exploration, this truck—designed for Terra-Tires—can range over any terrain.

Hauling peat out of bogs, Terra-Tires move easily where other tires would spin and dig in.

Won't even harm a golf green! Golf cars with Terra-Tires roll right over greens without damage to grass.

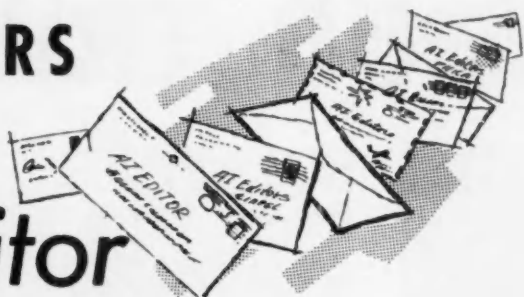
Where can Terra-Tires save for you? Designers: by designing vehicles from the start to utilize engineering advantages of Terra-Tire transportation, substantial savings in space and weight can be realized. For more information, contact Goodyear, Aviation Products Division, Akron 16, Ohio.

GOODYEAR

LETTERS

to the

Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of **AUTOMOTIVE INDUSTRIES** are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, **AUTOMOTIVE INDUSTRIES**, 56th & Chestnut Sts., Philadelphia 39, Penna.

HUMAN ENGINEERING

It would be greatly appreciated if five copies of the five human engineering reports mentioned in the June 1 issue of **AUTOMOTIVE INDUSTRIES** could be furnished the U S Army Ordnance Human Engineering Laboratories, Aberdeen Proving Ground, Maryland.

The U S Army Ordnance Human Engineering Lab is the central human factors engineering agency for the Ordnance Corps and has the responsibility for collecting and analyzing data and disseminating it to Ordnance Corps elements responsible for designing Ordnance material.

When received, the articles will be distributed to interested Ordnance agencies and personnel connected with human factors engineering who possibly may have not seen the reference.

Charles W. Houff
Lt. Col., Ord. Corps
Deputy Director

● Information for obtaining reports is on the way—Ed.

ENGINE SPECS

I would greatly appreciate receiving a wall chart covering the 1960 specifications for small gasoline and diesel engines. It would be of great help to me in my work.

George H. Wolfe
Mechanical Engineer
D. W. Onon & Sons
Minneapolis, Minn.

COOPERATION VS CRITICISM

In a program as vast as that of National Defense, with millions of people, military and civilian involved, mistakes are bound to be made. However, the endorsement given the program by the Congress, in bi-partisan action, answers in deed many of the critics, just as

your editorial replies in words—words which I can assure you are welcome—and a refreshing change.

Errett P. Scrivner
Deputy
Office of the Asst.
Secretary of Defense
Washington, D. C.

I was very much interested in reading the editorial "Cooperation versus Criticism" in the July 15th issue of **AUTOMOTIVE INDUSTRIES**.

It is unfortunate that the public is so prone to criticize without having knowledge of the facts.

Our instruments of defense today not only take a great deal of time in the laboratory, but there is a trial and error period to prove whether or not the instruments are practicable. It is a very easy matter for the D O D to order end items . . . I have seen it so many times during a period of emergency when much less complicated instruments than those used today failed to function. The country could waste hundreds of millions of dollars by ordering before an item has been proven successful. While there is a lot of red tape in the D O D, a great deal of it could be eliminated and a conclusion reached at a much earlier date than has been the practice.

A. E. Van Cleve
Vice Chairman
Republic Industrial Corp.
Newark, N. J.

QUALITY CONTROL

I certainly enjoyed reading the "Inside Story" of Cadillac Quality that appeared in the July 1 issue. It was very interesting and well written.

William L. Mitchell
Vice President
General Motors Styling
G M Technical Center
Warren, Mich.

Here's why
we're up to our ears
in screws!
...SOUTHERN SCREWS



A stock of 1,500,000,000 fasteners is a whole lot of screws, bolts and nuts. Why maintain such a huge stock? Why mention it in our ads?

The reason 1,500,000,000 fasteners are stocked in Southern Screw's Statesville plant is to let you know that regardless of the size, head style, materials or finish of the standard fasteners needed for profitable assembly in your plant, Southern carries them in stock. This means that your order, large or small, can be on its way to you within hours after it is received, if you request rush service.

And you can be sure that the Southern fasteners you order are quality fasteners made with the know-how that comes from nearly 15 years of specialization in fasteners exclusively.

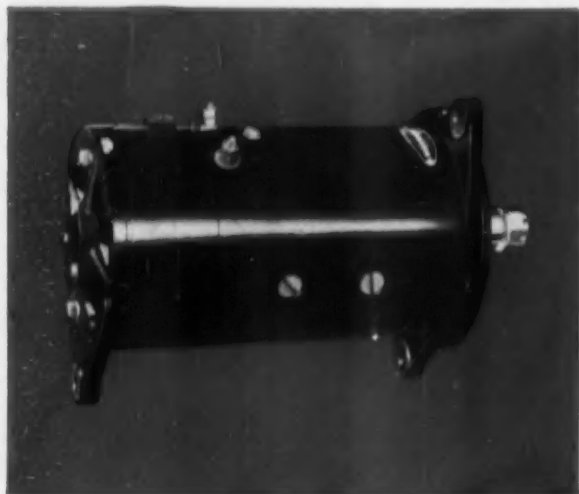
YOU are the reason we are up to our ears in fasteners! Southern makes them for you, stocks them for you. We are ready—today—to fill your order, whether for standards or for specials. Ask your local Southern distributor for our current Stock List or write direct to: Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock
in Statesville, North Carolina
Warehouses: New York • Chicago • Dallas • Los Angeles
Machine Screws & Nuts • Tapping Screws •
Slave Bolts • Drive Screws • Continuous
Threaded Studs • Carriage Bolts • Wood Screws

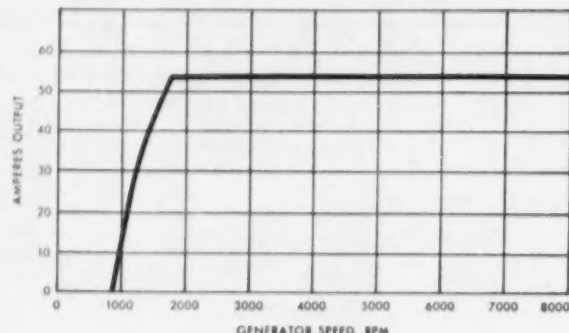


Circle 114 on Inquiry Card for more data

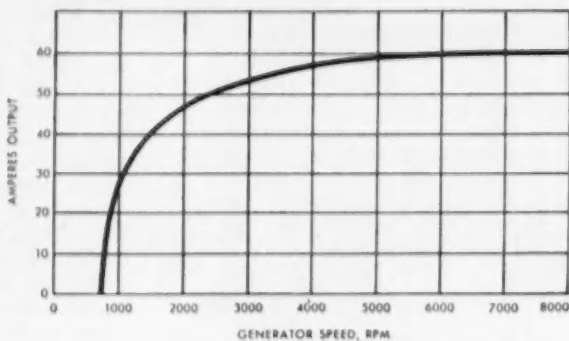
TAILOR YOUR TRUCKS



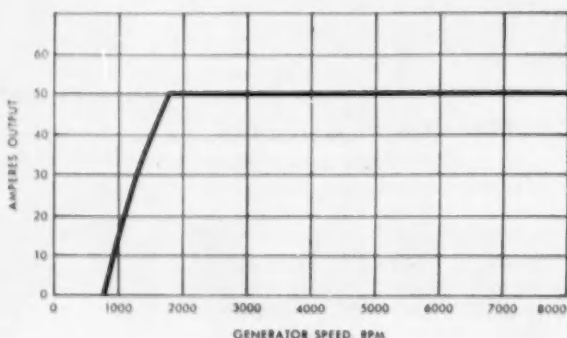
1106991 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 55 amperes • 12 amperes at idle—For cross-country trucks, school buses and other vehicles with extra electrical equipment.



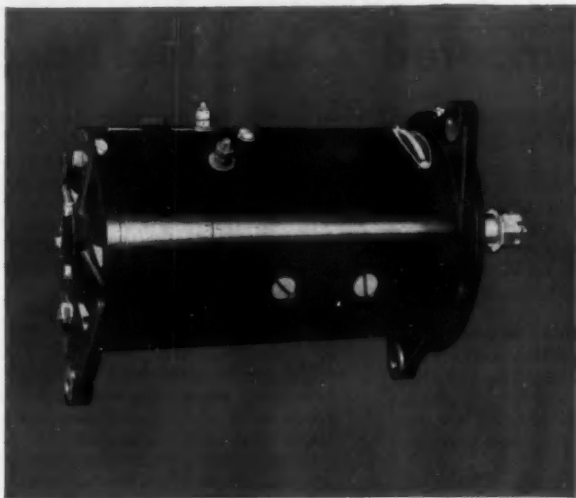
1117070 SELF-RECTIFYING A.C. GENERATOR—12 volts • 60 amperes • 27 amperes at idle—For high-duty vehicles with heavy electrical loads . . . operating at all speed ranges. Ideal for excessive low-speed operation and curb-idling.



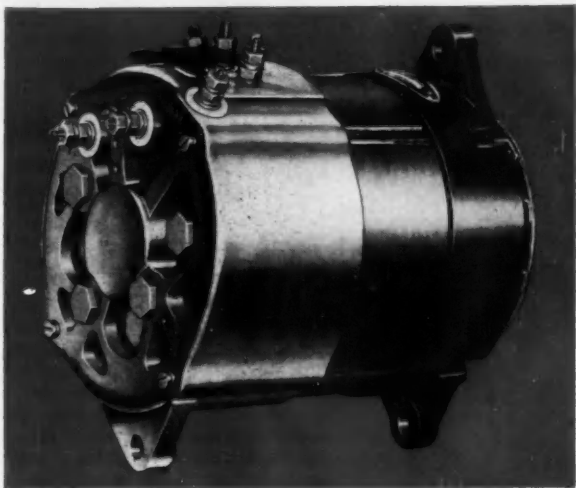
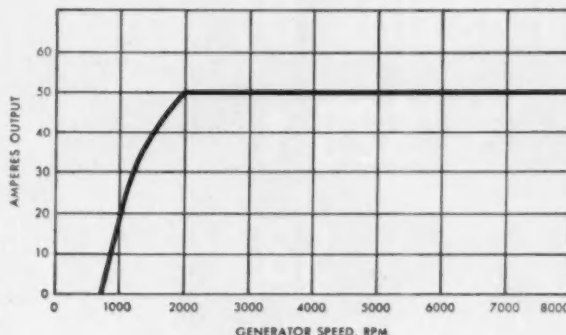
1106985 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 50 amperes • 14 amperes at idle—Short frame generator for difficult mounting applications. For vehicles in city and suburban use. Not for cross-country operation.



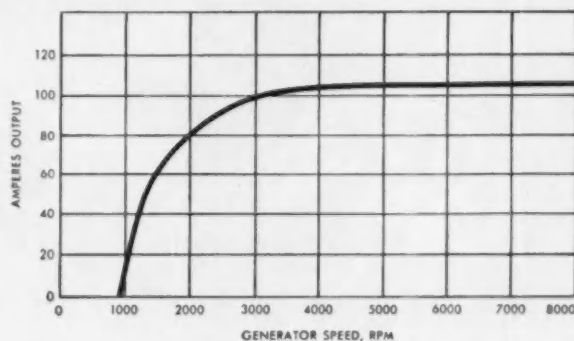
TO JOB CONDITIONS



1106986 EXTRA-OUTPUT D.C. GENERATOR—12 volts • 50 amperes • 20 amperes at idle—For metropolitan trucks and school buses, with extra electrical equipment . . . operating at low speeds and with engine idling most of the time.



1117115 SELF-RECTIFYING A.C. GENERATOR—12 volts • 105 amperes • 10 amperes at idle—For high-duty vehicles with extra-heavy electrical loads . . . operating at all speeds. A.C. voltage available for 110 V conversion.



Delco-Remy offers a complete line of D.C. and A.C.▪D.C. generators that are right for the job.

Demands on the electrical systems of trucks vary with their use. For best performance, whether the vehicles be new or already in service, the electrical equipment should be job-matched to meet those demands.

Do your trucks have extra electrical equipment? Operate cross-country, around town or off the road? Do they travel at sustained highway speeds, or with plenty of

stop and go? Whatever their assignment, there are Delco-Remy extra-output generators and regulators job-matched to meet the electric power needs *exactly*.

Delco-Remy ELECTRICAL SYSTEMS



FROM THE HIGHWAY TO THE STARS
DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Circle 115 on Inquiry Card for more data

Are You
Passing Up
\$29 to
\$87
Per Ton
Savings?

Enjoy These Spectacular Savings with Bliss & Laughlin's Exclusive Strain-Tempered® Alloy Steel Bars!

Do you buy or specify heat treated alloy cold finished steel bars?

You can save \$29 to \$87 per ton by substituting Bliss & Laughlin's Strain-Tempered Alloy.

That's a savings on material cost alone of 10% to 25%, without sacrificing the properties wanted most.

There are additional savings, too, depending on the parts you make from heat treated alloy bars.

Machining goes faster with less tool wear. Up to 30% better machinability is common experience.

Heat treatment costs on finished parts are eliminated.

Straightening costs are avoided. There are no distortion problems with Strain-Tempered Alloy Bars.

Pay only for properties needed

Strain-Tempered Alloy Bars meet the same specifications for tensile strength, yield strength, fatigue strength and hardness as heat treated alloy bars with \$29 to \$87 less cost per ton. For

example, in the strength most commonly specified for heat treated alloy bars, Strain-Tempered 4140 and 5150 are produced in all sizes of rounds through 3½" to the following minimum specifications:

Tensile Strength.....	125,000 psi Min.
Yield Strength.....	105,000 psi Min.
Elongation in 2".....	14% Min.
Reduction of Area.....	45% Min.
Brinell.....	269/321

As can be seen, for 10% to 25% less cost, Strain-Tempered Alloy Bars meet all physical properties most frequently specified.

Strain-Tempered 4140 is also available with the following mechanical properties:

Tensile Strength.....	145,000 psi Min.
Yield Strength.....	125,000 psi Min.
Elongation in 2".....	12% Min.
Reduction of Area.....	40% Min.
Brinell.....	286/321

Higher tensile strength levels, approaching 200,000 psi, can be furnished at attractive prices.

You pay only for the properties you actually need. That's why Bliss & Laughlin's Strain-Tempered Alloy Bars are your best buy.

Machinability improved up to 30%

Strain-Tempered Alloy Bars machine up to 30% better than heat treated alloys of the same hardness including leaded alloys. This substantial improvement in machinability is, of course, predictable because a pearlite-ferrite micro-structure machines better than tempered martensite at the same hardness.

Comparative tests in Bliss & Laughlin's machinability laboratory show Strain-Tempered Alloy Bars machine with up to one-



third less power consumption, show better chip characteristics, produce cooler parts and assure longer tool life than heat treated alloys at equal hardnesses.

Available in all finishes

Strain-Tempered Alloy Bars are available with these finishes:

- Cold Drawn
- Ground and Polished
- Turned and Polished
- Turned, Ground and Polished

Less lead time required

Lead time is substantially less than required for regular heat treated alloy bars. This is another big advantage of specifying Strain-Tempered Alloy Bars. Strain-Tempered Alloy Bars are usually manufactured to customers' specifications. However, some of the most commonly used grades in popular sizes will soon be available at Steel Service Centers, which have stocked Strain-Tempered Carbon Bars for years.

What are Strain-Tempered Bars?

Strain-Tempered Alloy Bars are manufactured by a special process of drawing and furnace treatment. This produces strength and hardness levels usually obtained only by quench-and-temper heat treatment. Furnace aging at the ideal temperature for at least four hours in large, modern annealing furnaces assures maximum uniformity and minimum distortion.

Pioneered by Bliss & Laughlin

High-strength, furnace-treated steel bars were pioneered by Bliss & Laughlin over 30 years ago. Today, Strain-Tempered bars are produced in both alloy and carbon grades.

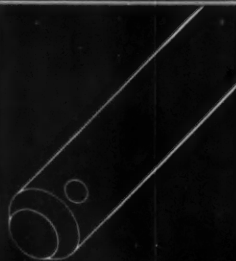
The first Strain-Tempered bar was delivered in 1929 for automobile drive shafts. Large quantities of Strain-Tempered Alloy Bars are now being furnished for drive shafts, as well as for many other products.

Nearly 70 years of research and development leadership back Bliss & Laughlin's Strain-Tempered production.

Investigate your savings now

A Bliss & Laughlin representative will recommend the most suitable, least costly grade. He will present tangible evidence, without obligation, of how Strain-Tempered Alloy Bars can cut your material and production costs. Contact your nearest Bliss & Laughlin sales office or mill today.

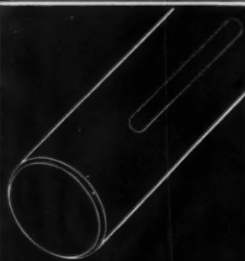
**SAVES
\$64/TON**



TRUCK BODY PIN

2¼" round 4140 heat treated, stress relieved, 269/321 Brinell. Strain-Tempered 5150 saves \$64.00 per ton.

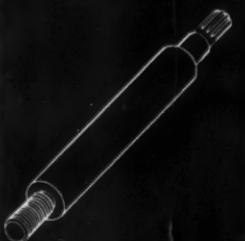
**SAVES
\$49/TON**



WINCH SHAFT

1¾" round 5150 heat treated, stress relieved, Drawn, Ground and Polished, 262/311 Brinell. Strain-Tempered 5150 reduces material costs \$49.00 per ton.

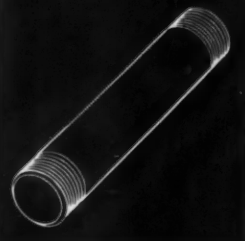
**SAVES
\$87/TON**



MACHINERY SHAFT

2¾" round 4140 leaded, heat treated, stress relieved, 269/321 Brinell. Strain-Tempered 5150 saves \$87.00 per ton.

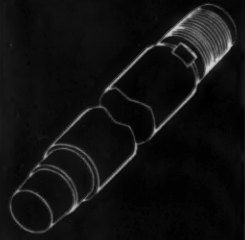
**SAVES
\$49/TON**



STUD

1½" round 4140 heat treated, stress relieved, 240/283 Brinell. Strain-Tempered 4140 cuts \$49.00 per ton from material costs.

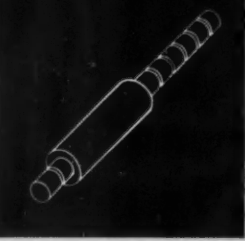
**SAVES
\$29/TON**



CHROME PLATED HYDRAULIC PISTON ROD

2.252/2.258" round 4140 heat treated, 269/321 Brinell. Strain-Tempered 4140 lowers costs \$29.00 per ton.

**SAVES
Added Costs**



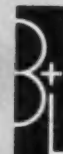
MACHINE TOOL SHAFT

1½" round 4140 annealed and cold drawn, then heat treated and straightened after fabrication. Strain-Tempered 4140 saves the cost of heat treatment and straightening.

Specialists in Finish, Accuracy, Straightness, Strength and Machinability

BLISS & LAUGHLIN

GENERAL OFFICES: Harvey, Ill. • MILLS: Harvey, Detroit, Buffalo, Los Angeles, Seattle, Mansfield, Mass.



*Leading
Independent
Producer of Cold
Finished Steel Bars*

Circle 117 on Inquiry Card for more data

Do your aluminum engine programs include faced valves?

*the cost may be far less
than you think*

The Eaton Econoseat process of applying heat-resistant and corrosion-resistant materials to valve faces makes possible a considerable saving in the amount of costly protective alloys required. This economy permits the use of faced valves where they might not otherwise be practical.

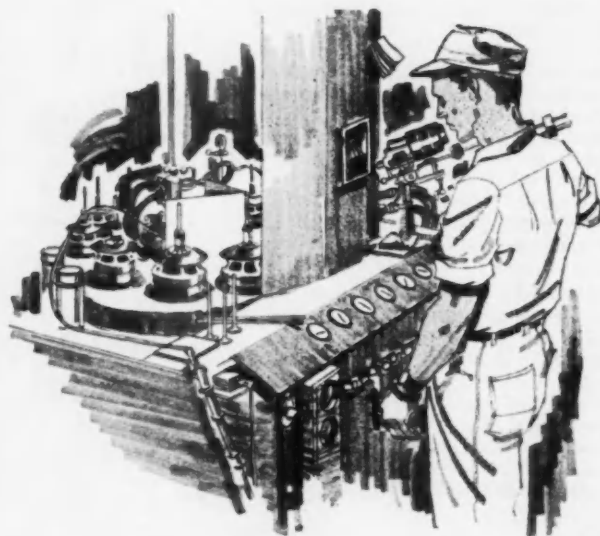
Eaton Econoseat Valves, faced with the Eaton-developed materials best suited to solve specific heat and corrosion problems, have proved their ability to provide superior durability at low cost.

We would like to help you build maximum durability and performance into your aluminum engines. Call on us—there is no obligation.

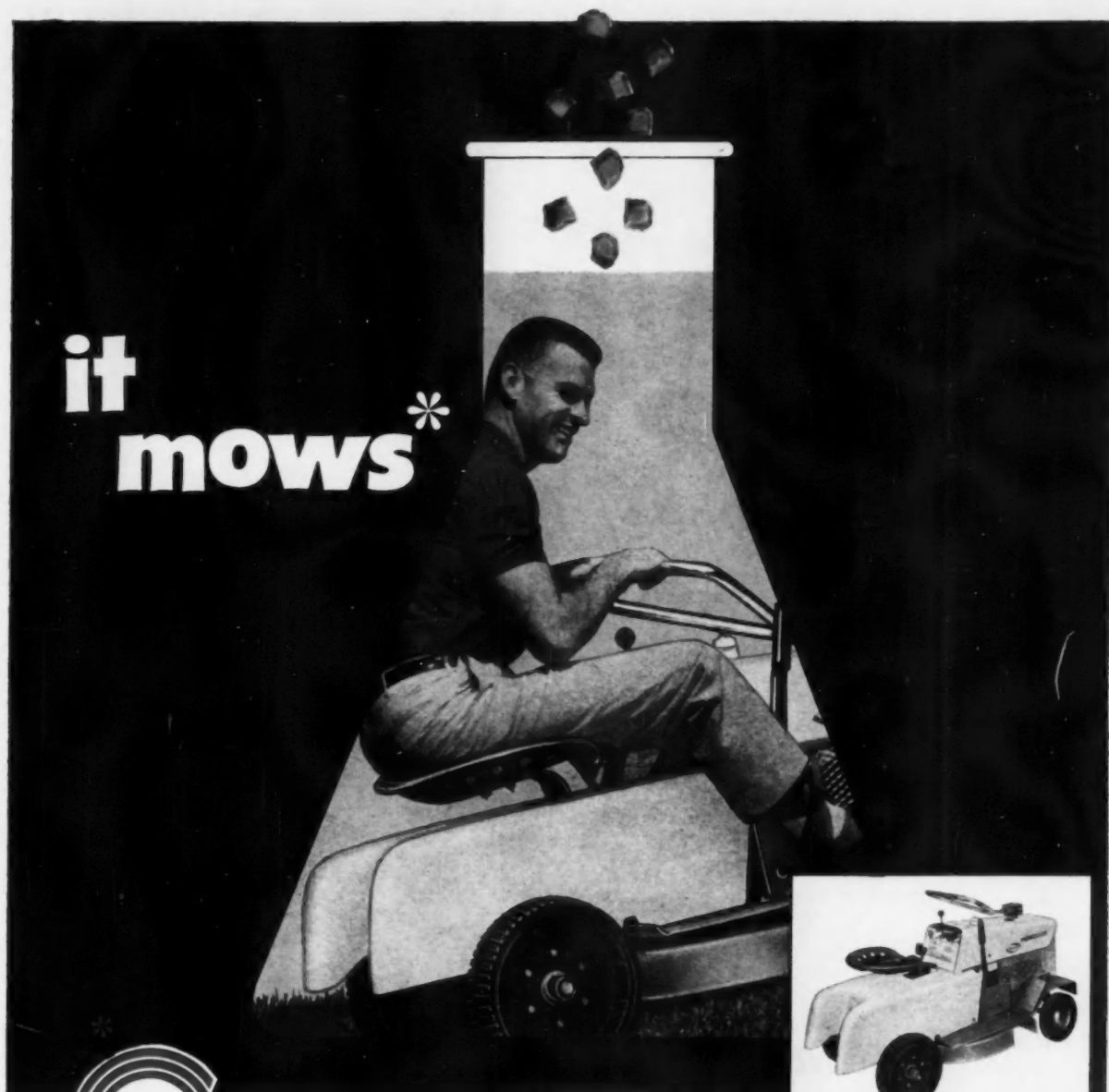


EATON

VALVE DIVISION
MANUFACTURING COMPANY
BATTLE CREEK, MICHIGAN



it
mows*



CYCOLAC[®]

THE BORG-WARNER PLASTIC THAT'S TOUGH, HARD, AND RIGID

Homelite Division of Textron Inc. specified CYCOLAC for the body sections of its ride-on lawn mower because this lightweight, ABS material was the one plastic that offered the rugged durability required by such outdoor equipment. With the high impact strength of CYCOLAC, the body is protected against damage from knocks and blows. In addition, CYCOLAC eliminates corrosion and staining, insuring a mower body that will retain its attractive, glossy appearance. Because of its unique combination of properties, CYCOLAC can be used for many products formerly made of metal—at substantial savings. It may be the material that will make **your** product more profitable. Why not discuss this with one of our representatives? Write today.

MARBON CHEMICAL
WASHINGTON



DIVISION **BORG-WARNER**
WEST VIRGINIA



*The wheel head **TILTS** 30°!.....*

*The **NEW NORTON No. 200 Cutter and Tool Grinder**
makes setups simpler... easier... quicker!*

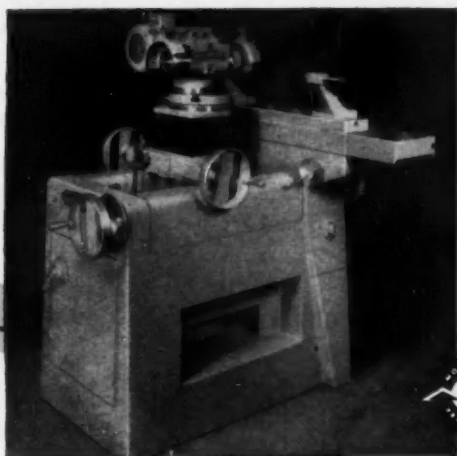


Tool room men can tell you that grinding a taper reamer is one of their toughest jobs. But now they're discovering that it and other tough tool grinding jobs are a "snap" with the new Norton No. 200. Because:

You can tilt the wheel head up to 15° above or below horizontal — and swivel it through a full orbit of 360°.

And the table has a very rugged, extremely accurate guide bar, which assures precision in tracking, during the most difficult grinding jobs.

All this means no more time-wasting "cut and try" tactics... no more wrestling with tricky setups... a wheel head scale provides quick direct readings of clearance angles... for practically all grinding on centers, the



ORBITS 360°!

VISIT BOOTH #651

Machine Tool Exposition • 1960
INTERNATIONAL AMPITHEATRE
Chicago — September 6-16

tooth rest can be kept on the center-line of the cutter, eliminating time losses from additional settings . . . the table design enables use of gage blocks for quick taper grinding setups and fast return of table to straight setting . . . greater wheel head capacity through eccentric mounting simplifies approach to many special jobs.

In addition:

The No. 200's extremely solid grinding action brings you excellent finish on tool cutting edges, with resulting benefits in tool life and performance. That's because the No. 200 is a wheel slide type machine, where grinding is always within the area of the rigid base, with no instability due to work overhang. Other advanced features include: quick-change two-speed wheel drive; centrally located column controls, wheel slide dials readable from any position.

Your Norton Man, a trained grinding engineer, will be glad to show you how the new Norton No. 200 cutter and tool grinder can help you modernize and economize in your plant. For catalog #1371, write to NORTON COMPANY, Machine Division, Worcester 6, Mass. *District Offices:* Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.



**75 years of . . . Making better products
. . . to make your products better**

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

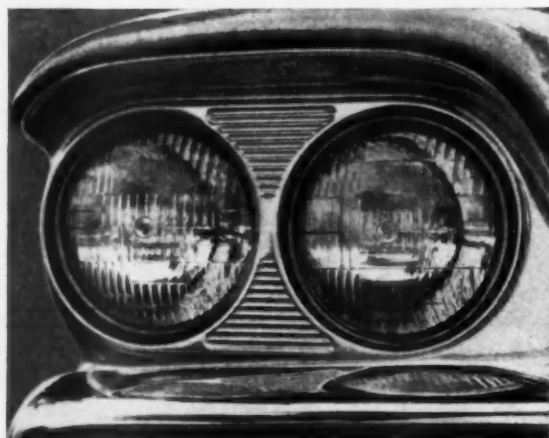
A lifetime of light crammed into 15 days



Tung-Sol headlamps are subjected to the severest set of tests in the industry—from raw materials to finished product—before they reach the highways of the world.

One of the most critical final examinations they face is the life test. First, samples of each production run are checked for maximum candle-power, amperage and wattage at design volts. They are then placed in the aging racks and burned at accelerated voltages to assure full completion of their designed life. In this case the low beams of 12 volt headlamps burn continuously at accelerated voltages for fifteen days to make sure they'll produce the 500 hours of peak performance required by S.A.E. specifications.

This test is an example of Tung-Sol's leadership in quality mass production of headlamps . . . leadership which started at the turn of the century when Tung-Sol produced the first successful electric headlamp. Automotive Products Division, Tung-Sol Electric Inc., Newark 4, New Jersey. TWX:NK193.



TUNG-SOL®

HEADLAMPS • MINIATURE LAMPS • FLASHERS

to fasten
panels
or parts . . .

LIGHT, STRONG TRIMOUNT STUDS

Designed for rapid assembly of sheet-metal, plastic or composite structures, Dot Trimount studs are available in both permanent and removable types. They can be pushed into drilled, stamped or molded holes by finger-pressure alone yet they lock positively in place and resist constant vibration.

Studs can be designed in steel or brass with various flange configurations for clinch, clip or clamp attachment to flexible or rigid panels as well as for push-through assembly. Available in all standard finishes . . . with or without decorative caps.

DESIGN ENGINEERING SERVICE

Designers, metallurgists and plastics specialists on Dot's engineering staff are equipped to work out optimum combinations of metal and plastics to suit your particular requirements.

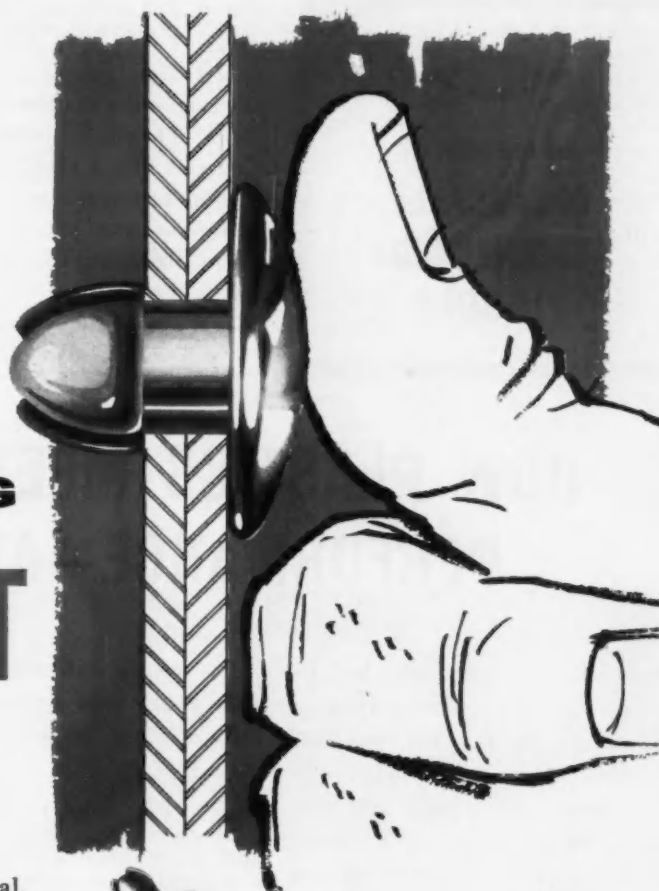
► For further details,
write for Engineering Data Catalog, Section H



CARR FASTENER COMPANY

Division of United-Carr Fastener Corporation, Cambridge 42, Mass.

Offices in: Atlanta, Boston, Chicago,
Cleveland, Dallas, Detroit, Kalamazoo, Los Angeles, Louisville, New York, Philadelphia, Syracuse





News about
**CHEMICALLY
ENGINEERED
PLASTICS**

Throughout the automotive industry, you'll find modern plastics at work. They contribute to the stylish, attractive appearance of car interiors. They simplify production. They even help achieve long life in the equipment used to make and service cars. The continuing development of plastics technology at Dow has provided automotive men with many ways to add to the performance and sales appeal of their product.

DOW PLASTICS MEET DEMAND FOR PERFORMANCE—AT LOW COST

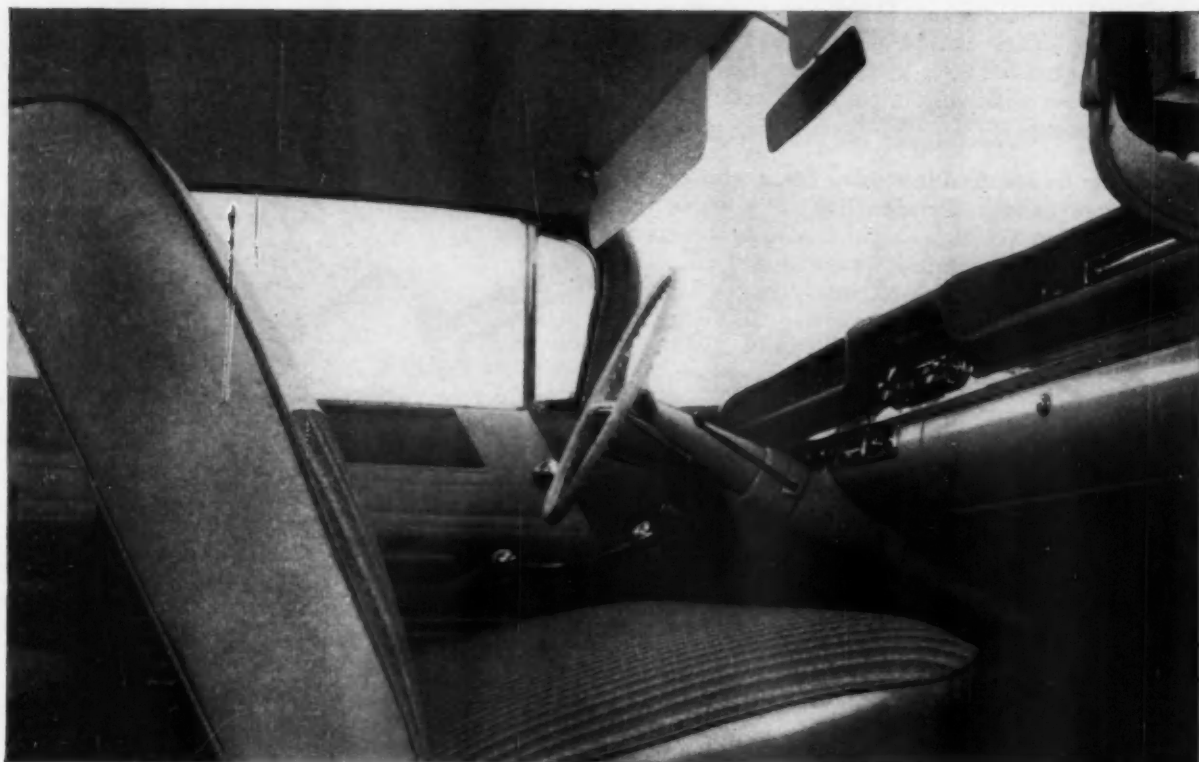
Today's style-conscious, value-alert buyers place strong demands on a car's interior. Colorful good looks are a must! But over and above appearance, new-car buyers demand hard-wearing, abuse-taking upholstery that's easy to clean.

These many customer requirements are met fully with the help of vinyl fabrics made with Dow PVC . . .

Dow PVC (polyvinyl chloride) solves tough fabric problems involving both appearance and serviceability for seat upholstery, side panels and roof liners. With a vast array of colors and

color combinations possible, fabrics of Dow PVC can be supplied in any desired surface pattern . . . with the extra value of texture and feel that spell superb quality to the serious buyer and casual shopper alike.

Besides adding eye-appeal, these fabrics have excellent aging characteristics to assure the lasting value of durability. They are cleaned with a damp cloth . . . with warm water and



soap or other mild cleansing agent needed only for the most stubborn dirt spots.

Dow supplies PVC resins, with their excellent processing characteristics, to calenderers of fine interior fabrics that help sell cars—make them more enjoyable to own and drive.

Dow Latex 2582, for the underside

of automotive fabrics, makes possible even the lightest of colors. This, in turn, opens the door for high-styled fabric patterns with varied weaves, fleck designs and other creative ideas of automotive designers.

In addition, backing formulations made with Latex 2582 are highly resistant to stains—even copper and

other metallic dyes—as well as to fading and aging. Dow supplies Latex 2582 both to backing formulators and to fabric manufacturers.

While Dow PVC and Latex 2582 help provide more colorful, more serviceable fabrics, other Dow plastics products help car makers in other ways . . . such as in the examples below.

SOLVE TOUGH AIR CONDITIONING PROBLEMS WITH STYRON 440

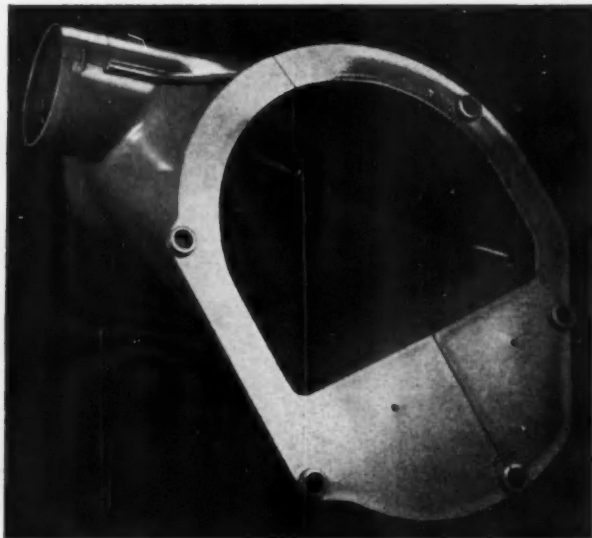
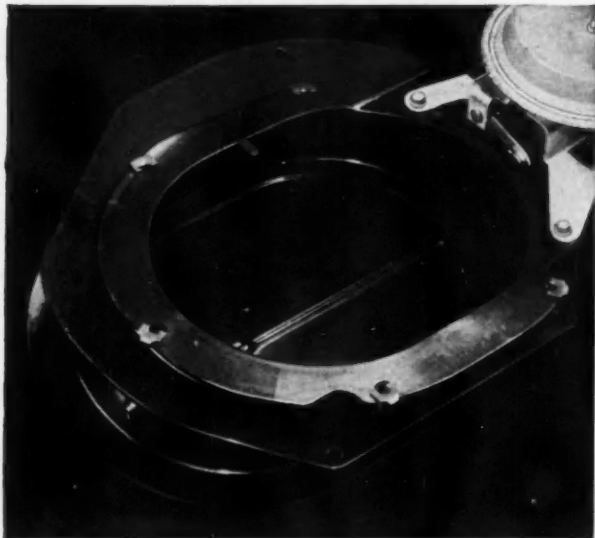
Air conditioning answer. Styron® 440 helps automotive engineers design better heating and air conditioning system parts. This rugged Dow thermoplastic cannot absorb or transmit water. Thus, no change of dimensions due to moisture, no deterioration. No distortion from the wide range of temperatures encountered in automobile operation, either. Parts made of Styron 440 keep their snug fit throughout their long

service life.

These parts are lightweight—much lighter than materials commonly used in such automotive applications. And they require no painting for protection or appearance's sake. The color—any color—is molded into the material. This means no unsightly paint chipping wherever parts are on view in the car interior.

Takes tough treatment. Styron 440

goes to the head of the class on the automotive production line, too. Its excellent moldability and fabrication characteristics cut manufacturing costs neatly. (Very few rejects, for example . . . almost none.) It's tough enough to withstand the knocks and bruises of assembly operations. Takes staples, self-tapping screws and other joining devices without a whimper, and keeps them in place on the roughest roads.



ETHOCEL: A "HELMET" FOR HEADLIGHT AIMERS!

The same material that has proved its toughness and stamina in helmets for pro football players also helps assure long life for equipment like this headlight aimer. For rugged service, its cover is made of Ethocel®, which provides great toughness and high impact strength over wide temperature ranges.

Besides withstanding severe shock, Ethocel resists chemicals, yet provides dimensional stability to ensure perfect production line assembly of close tolerance parts. Ethocel has the additional advantage of an attractive, glossy surface that's easy to maintain.



For more information, for help in putting these materials and many other members of the Dow family of plastics to work profitably for you, call on Dow. We suggest you contact the nearest Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1710T8-15.

THE DOW CHEMICAL COMPANY
Midland, Michigan



**A
SHORT STORY
ABOUT SPRINGS**

A **BURTON** coil spring



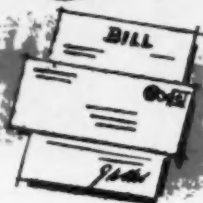
or a **BURTON** leaf spring



brings continued smiles
from drivers




and fewer bills
for maintenance



ask White, Mack, Diamond T, Dodge, Studebaker, Reo or Fruehauf

...or ask us...we've been engineering top quality springs since 1923

 **BURTON** Auto Spring Corporation

WESTERN AVENUE AT 48TH STREET • CHICAGO 32, ILLINOIS



Recognized "Hauling Card" on America's Leading Trailers

Because Rockwell-Standard® supplies axles (Rockwell-Standard and Timken-Detroit) in such volume and in so many different forms to meet a constantly growing variety of requirements, it has become one of the best known names within the automotive field.

For more than 50 years Rockwell-Standard has been an aggressive pioneer of new axle designs and development. Today, with six modern plants devoted to the exclusive production of axles and related components, combined with modern research and testing facilities, Rockwell-Standard is a vital factor in the growth and success of the truck-trailer industry. Only Rockwell-Standard offers all these outstanding

benefits to its customers — *benefits no trailer manufacturer could economically afford or duplicate on his own.*

ONLY ROCKWELL-STANDARD OFFERS:

1. Complete Line of Axles in Wide Range of Capacities.
2. 50 Years of Know-How and Experience.
3. Complete Design, Research and Service Organization.
4. Ready Reservoir of Labor and Material to Meet Varying and Seasonal Demands.
5. World's Most Modern and Extensive Axle Building Facilities.
6. Undivided Responsibility for Complete Component.
7. Dependable Products with Years of Established Acceptance.



*World's Most Specified Axles
for Truck Trailers*

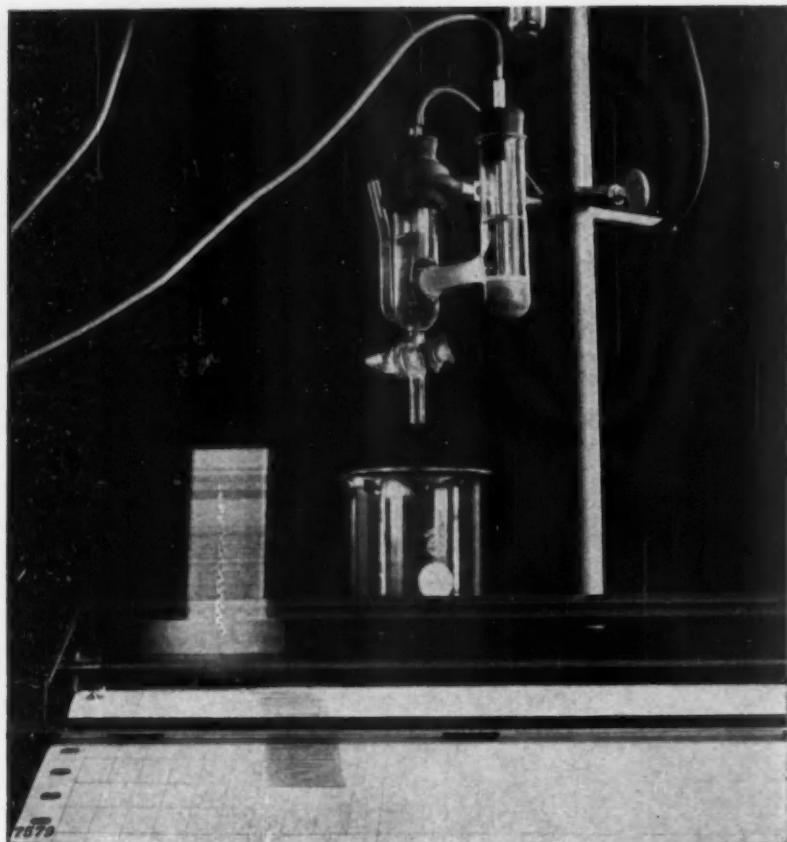
ROCKWELL-STANDARD
CORPORATION

A CONSOLIDATION OF THE TIMKEN-DETROIT AXLE COMPANY AND STANDARD STEEL SPRING COMPANY

Transmission and Axle Division, Detroit 32, Michigan



ANALYTIC "BLOODHOUND" SNIFFS OUT SECRETS OF BEARING CORROSION

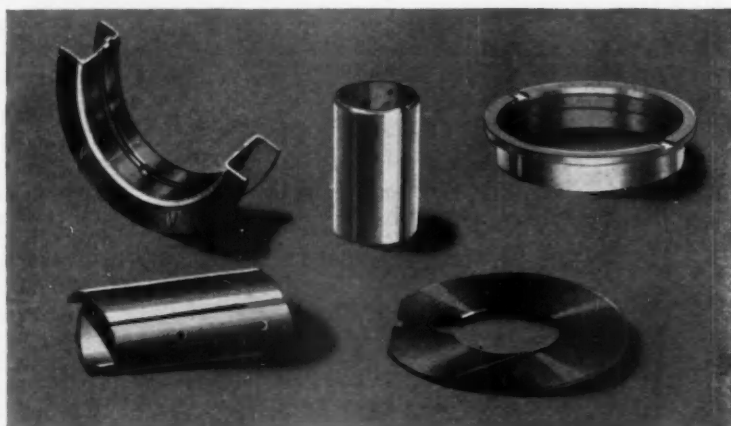


WE USE THIS HYPERSENSITIVE DEVICE TO TRACK DOWN ENGINE BEARING CORROSION TO ITS SOURCE.

This instrument needs only a minute fragment of metal for accurate analysis. Consequently, engine bearing corrosion can be traced from its beginning through complete destruction of the bearing surface. Because test variables are minimized, Federal-Mogul engineers can accurately relate degree of corrosion to specific engine operating conditions. This analytical tool is in continual use in our laboratory, assisting research on many different projects. Prevention of corrosion and development of new bearing alloys are high on the list!

SUCCESSFUL BEARING PERFORMANCE

depends on selecting the proper alloy for the operating conditions to be met. Federal-Mogul engineers have had years of experience with bearings and applications of all kinds . . . and this wealth of knowledge is available to bearings users. This is one reason why F-M sleeve bearings, precision thrust washers, formed bushings, and low-cost spacers are chosen for use in virtually everything from baby buggies to heavy industrial cranes.

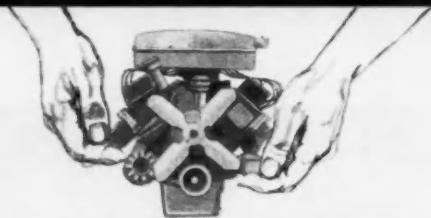


There's much valuable data in our Design Guides on sleeve bearings, thrust washers and bushings; and in our brochure on spacers. For your copies, write Federal-Mogul Division, Federal-Mogul-Bower Bearings, Inc., 11037 Shoemaker, Detroit 13, Michigan.

FEDERAL-MOGUL

sleeve bearings
bushings-spacers
thrust washers

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.



give the gentleman what he wants . . .

...design Creativity

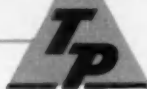


Should piston rings be coated or sprayed with aluminum oxide to counteract abrasive action in aluminum engines? Are locked rings really necessary for V and flat engines? Are moly-coated rings the real answer in aluminum bores? Hundreds of such engine problems are being worked out today on dynamometers in the Ramco plant . . . on the highways . . . on the proving grounds of car and truck factories. Products of Ramco's design creativity are constantly on test and proving our slogan, "Give the Gentleman what he wants" . . . give the immense automotive industry the kind of cooperation in engineering effort that is sought . . . the full cooperation of TRW's resources and experience . . . the completely-manned engineering team and production know-how of one of the world's most modern piston ring plants. The story of our piston ring facilities is contained in a new book. May we send you a complimentary copy?

Piston Rings by THOMPSON PRODUCTS RAMCO DIVISION

Thompson Ramo Wooldridge Inc.

P. O. Box 513
Dept. H, St. Louis 66, Mo.



AUTOMOTIVE GROUP

THOMPSON PRODUCTS
LIGHT METALS
DIVISION

THOMPSON PRODUCTS
MICHIGAN DIVISION

THOMPSON PRODUCTS
VALVE DIVISION

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RAMCO DIVISION

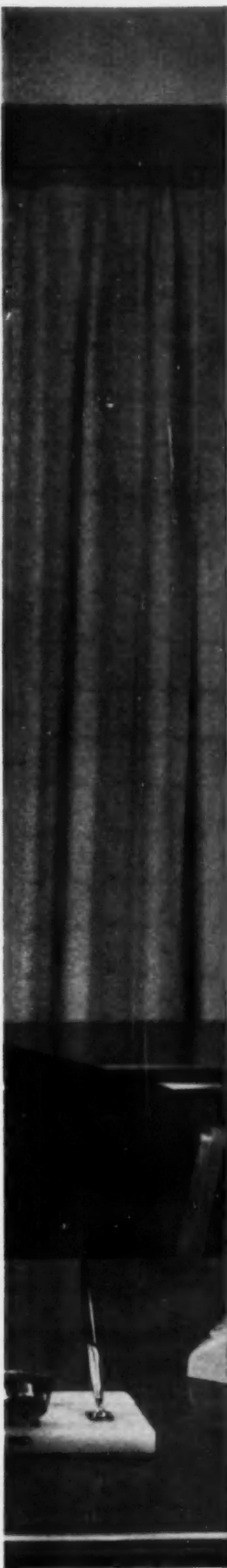
THOMPSON PRODUCTS
MOTOR EQUIPMENT
MANUFACTURING DIVISION

Circle 128 on Inquiry Card for more data

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THE AMPLEXOLOGIST





The Amplexologist occasionally gets more than he bargained for. But that's not bad. It's good. In fact, it's like hitting the jackpot on the 123rd try.

Why? Well, the Amplexologist has convinced any number of manufacturers that a few of the parts in their products can be made better and cheaper by eliminating machining costs through advanced powder metallurgy (i.e. Amplexology).

Strange to say, however, many of these same manufacturers are often hesitant about exploring the broad application of powder metallurgy to their product. Well, it takes time. But sooner or later most of them take the plunge:

O.K., Genius. Let's see how good you really are. Take all the prints for our new models. Check every one. Then you tell us how many parts can be made out of powder metal. And how much they'll cost.

You see? Jackpot. And not just for the Amplexologist. For the manufacturer, too. A cost saving jackpot . . . because he's starting when designs are still flexible to take full advantage of powder metallurgy.

Challenges like this ("You tell us . . .") pay off for manufacturers and for us. They have in fact, helped make us the world's largest and most experienced producer of powder metal parts. Another reason why leading manufacturers say: **When it comes to powder metallurgy—Amplex has the answer.**



"You tell us . . ."

The parts shown are a new gear train: driver gear, high and intermediate speed driven gears, low speed gear, pinion gear. These five parts plus ten more were selected by the Amplexologist—who was called in at the design stage—for powder metal production. All are finished precision parts which require no machining (except the helical gear). Estimated savings on the gear train, 86%.

AMPLEXOLOGIST

SEND COUPON . . . if you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.

AMPLEX DIVISION • CHRYSLER CORP. • Dept. A-8
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME

COMPANY

ADDRESS

CITY STATE

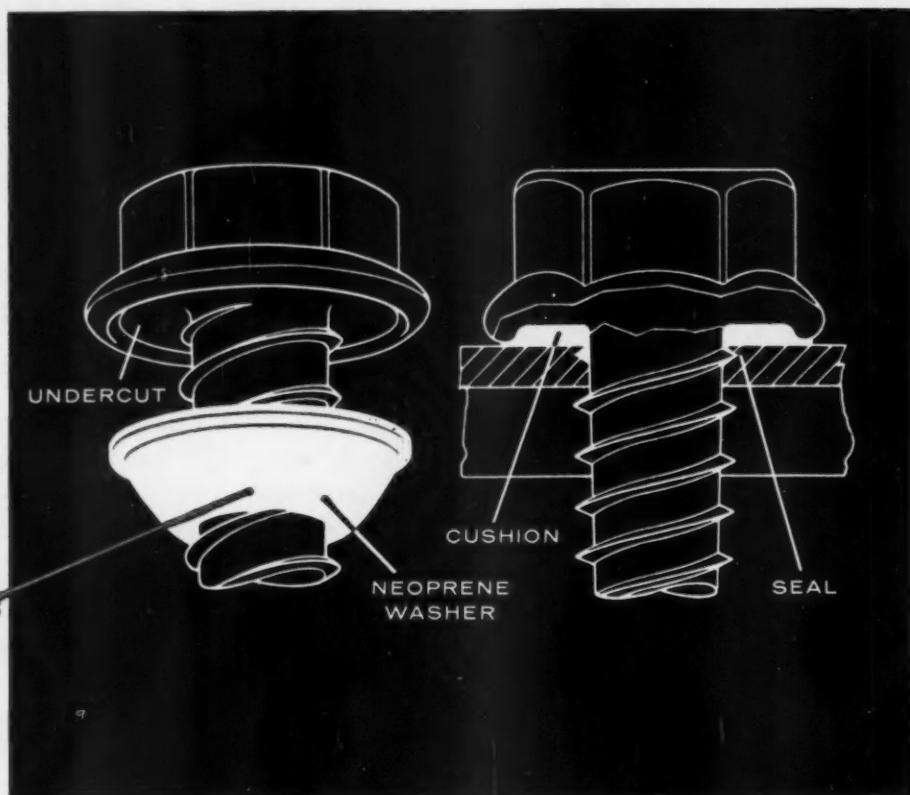
PRODUCT

AMPLEX

DIVISION
CHRYSLER
CORP.



NAT'S
quick facts
about
Fasteners...



With **TUFF-TITE** TRADEMARK Fasteners ...it's the **cushion control** that counts!

You can be very sure of this, in using Tuff-Tite® Cushioned Fasteners.

The preassembled neoprene washer won't ooze off in just any old direction when it's compressed under the head.

It will stay put and do what it's intended to do:

- Form a firm, even cushion under the head
- Seal off the fastener hole
- Prevent fluid leaking past the thread
- Dampen vibration noises around the head
- Protect fine finishes against marring and crazing

... because Tuff-Tite's undercut head and tough molded neoprene washer assure consistent cushion control. The undercut confines the spread as the washer is compressed, and the molded

shape guides the flow into the top threads, to seal the hole.

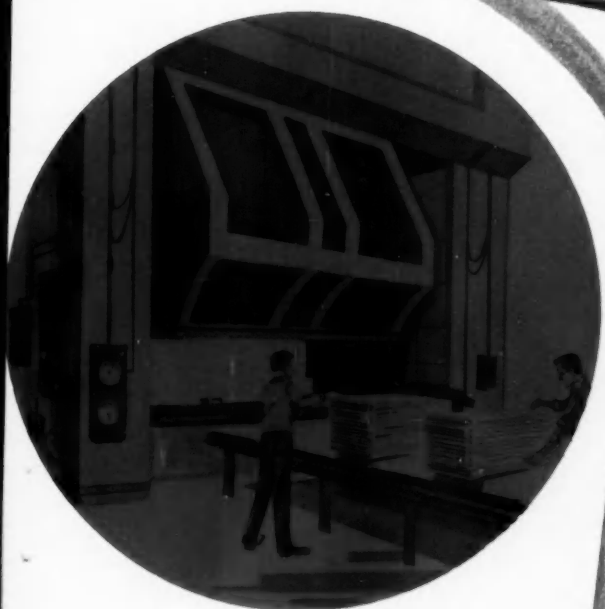
It's as simple and as certain as that, for any application requiring fastener sealing and cushioning. Tuff-Tite Fasteners* are available as Machine, Self-Tapping, or Wood Screws, as Stove and Roofing Bolts, and can also be made as Special Fasteners. We'll be glad to work with you on your possible applications.

*More details and specifications on standard types and sizes are given in the Tuff-Tite Fastener folder. Write for your copy.



The National Screw & Mfg. Company • Cleveland 4, Ohio

California Division, The National Screw & Mfg. Company • 3423 South Garfield Avenue, Los Angeles 22, California



SILICONES

NEW ENGINEERING
MATERIALS

for the Automotive
Industries

To get a free file copy of this booklet,
circle Reader Card No. 250

SILICONES

for the Automotive Industries

How to get a competitive advantage that will meet the challenge of a discriminating market? Researchers and designers are faced with this question as they strive to provide new product sales appeal. Production men are faced with it as they evaluate new manufacturing and maintenance techniques. Management meets it head on when they map new product sales strategies in light of shrinking profit margins.

In the great quest for quality-with-economy, more and more producers of automotive products are turning to Dow Corning Silicones as materials providing a higher degree of peak performance. Unknown two decades ago, silicone products are now available in a variety of physical forms and combinations, many of which are currently used to increase the efficiency of an automotive design or production line.

Whether you make tires or taillights, glass or gauges, fifth wheels or fuel pumps; whether you operate an independent feeder plant or a final "ready-for-the-road" assembly line, Dow Corning Silicones can help build better products more efficiently. The following pages will suggest many ways.

**New concepts,
new freedom...
with silicone products**



Dow Corning CORPORATION
MIDLAND, MICHIGAN

...IN RESEARCH AND DEVELOPMENT



EXPLORE SILICONES

FORMS:

*rubbers
resins
fluids
lubricants
dielectrics
laminates
paints
adhesives
defoamers
additives*

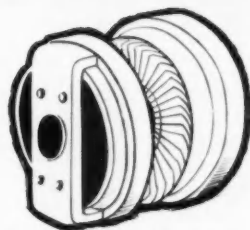
FOR:

*resistance to
heat, cold,
oxidation, weathering,
moisture, oils,
corrosion, fuels,
solvents,
low pressure steam,
most chemicals.
Also light in weight,
dielectrically stable.*

Silicones Point The Way To Better Products, Better Systems

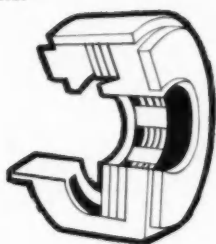
Silicones do double duty for research engineers, offering unique properties in "working" combinations for both construction materials and production aids. Outlined on the next page are some areas where Dow Corning Silicones can help you assure maximum performance of the automotive products of tomorrow. If additional technical information is desired, contact the nearest Dow Corning office.

New Power Plants...



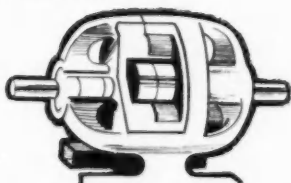
Development of new concepts in motive power constantly receives priority attention. Today it's power from fuel cells, gas turbines, electricity . . . and the sun is being tamed. Multifuel engines, midget diesels and electric motors with printed windings are in advanced stages. Power plants such as these, many with high operating temperatures, create natural applications for Dow Corning Silicones . . . silicone rubber seals and gaskets; silicone damping and drive fluids; and silicone dielectrics and electrical insulation. As engineering materials, silicones can help move new power plants from experimental lab to production line. Their capacity to withstand fuels, moisture and chemicals as well as heat, present advantages every researcher must investigate.

New Braking Systems...



Improved braking systems for tomorrow's vehicle stand high in research planning . . . combination air-hydraulic and anti-skid systems, multiple disc, self-adjusting, and lifetime lubricated brakes are in advanced stages. Where heat generation is a problem restricting practical application, Dow Corning silicone products offer pertinent advantages to the R & D man. For example, silicone rubber compounded for O-rings and gaskets resists the deteriorating effects of high temperatures generated by braking action, effectively prevents leakage of hydraulic fluids and oils. In addition, the properties of Silastic®, the Dow Corning silicone rubber, remain essentially unchanged over a temperature span from -110 to 500 F . . . insure efficient operation under all environmental conditions.

New Power Transmission...



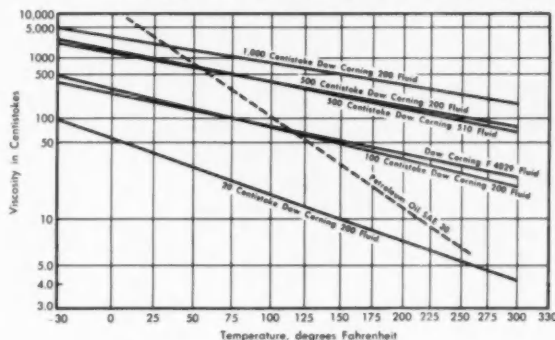
Increased power ratios demand more efficient clutches and transmissions. One advanced-design magnetic clutch makes extensive use of heat resistant Dow Corning silicone materials in coil insulation, lead wire, lubricants, gaskets and impregnating varnishes. Result: The clutch requires virtually no maintenance and is expected to last for the life of the equipment.

New Lasting Lubrication...

Near-constant viscosity or consistency of silicone oils and greases enables them to increase performance efficiency of automotive equipment and instruments. Properties such as their flat-viscosity temperature slope, in combination with unusually high resistance to heat, oxidation and gumming, plus noncorrosive action toward seals and metals are reasons silicone fluids and lubricants warrant consideration.

For more information, circle Reader Card No. 251

Viscosity vs Temperature, Dow Corning Silicone Fluids



New Electrical Components...

Advances in electrical instruments and controls, as might be found in a transistorized ignition, are often dependent on materials that readily withstand the effects of vibration, shock, high ambient temperatures and moisture. Dow Corning silicone products — rubbers, fluids, dielectrics, coatings, laminates, adhesives and others — facilitate miniaturization, have the precise properties to solve problems confronting the research and development engineer.

For more information, circle Reader Card No. 252

New Surface Protection...

Silicone-based paints and enamels provide the researcher with durable car finishes . . . coatings that withstand weathering, heat and corrosion — maintaining color, gloss and eye appeal. Such coatings can be formulated to withstand temperatures up to 1000 F. They last longer, are less fragile and, in many applications, are less costly than organic finishes.

For more information, circle Reader Card No. 253



Silicone-based paints, subjected to severe accelerated testing, show good flex life, high resistance to crazing, chalking, oxidation and peeling.



EVALUATE SILICONES

FORMS:

*rubbers
resins
fluids
lubricants
dielectrics
laminates
paints
adhesives
defoamers
additives*

FOR:

*resistance to
heat, cold,
oxidation, weathering,
moisture, oils,
corrosion, fuels,
solvents,
low pressure steam,
most chemicals.
Also light in weight,
dielectrically stable.*

In virtually all major areas of automotive design — in styling, performance, convenience, serviceability — silicones provide design engineers with the means to make good products better . . . to make design changes heretofore impractical . . . to help create preference for their products.

Dow Corning Silicones — *first* in silicones — have the diversity of physical forms and working properties needed to solve the toughest of design problems, to accomplish the most rigorous production assignments, efficiently and economically.

Severe-Duty Seals, Hose, Diaphragms of SILASTIC, the Dow Corning Silicone Rubber

Silastic stays rubbery under adverse operating conditions — provides a combination of properties that enables rubber manufacturers to design and fabricate parts that readily meet rigid performance requirements.

Silastic remains flexible at extremely low temperatures, does not soften or turn gummy at elevated temperatures. It is highly resistant to oxidation, weathering, corona and ozone. Low compression set is another desirable feature. Dow Corning's fluorosilicone rubber, Silastic LS, provides outstanding resistance to oils, hydraulic fluids, most fuels and solvents.

Parts and components designed by rubber manufacturers and made of Silastic for long, dependable service include: diaphragms for fuel regulators and heavy-duty brakes; seals for fluid converters and hydraulic cylinders; engine seals and mounts; wire and cable insulation.

For more information, circle Reader Card No. 254

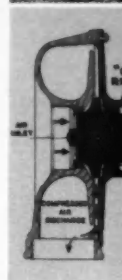
Typical Properties of Silastic for Seals

Temperature range °F	—130 to 500
Tensile strength, psi	600 to 1500
Elongation, %	150 to 400
Tear strength, lb/in	40 to 180
Compression set, %, @ 300 F	5 to 50
Hardness range, Durometer	25 to 80
Weather, ozone and corona resistance	Excellent

Fast, Low Cost Prototypes with SILASTIC RTV

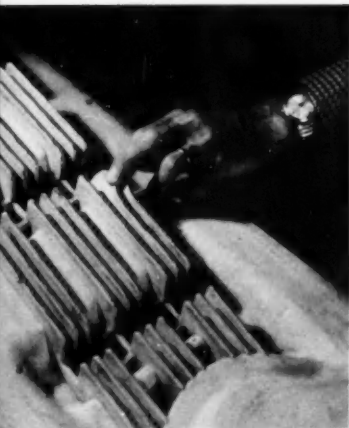
With Silastic RTV fluid silicone rubber, new designs in door handles, grille ornaments and instrument panel components can be "prototyped" without costly tools and handmade patterns. Readily pourable, Silastic RTV flows to fill the most intricate pattern; cures or vulcanizes at room temperature to an exact and firm-but-flexible impression of the original. Finished prototypes strip easily from the original, seldom require a release agent. Because it's *silicone* rubber, Silastic RTV accepts hot casting materials, including many plastics and metals, up to 500 F.

For more information, circle Reader Card No. 255





Caterpillar Tractor specifies O-rings made of Silastic for the turbocharger on their powerful D-9 heavy diesel crawler. Operating temperatures in the turbocharger are above 300 F; engine oil pressure is 20 psi. Exposure to oil at this temperature does not alter the effectiveness of Silastic in maintaining a seal.



Used by Detroit Plaster Cast Foundry, this Silastic RTV positive of an automotive grill will make up to 30 plaster negatives. Releases negatives fast, clean, easily. Detail is precise with tolerances held to \pm zero.

Stronger Parts with Silicone Laminates

Hot gas ducts, breaker-arm bushings, elevated-temperature shields, and other parts made of lightweight silicone-glass laminates maintain higher strength-to-weight ratios at elevated temperatures than do many light metals. Silicone-glass laminates resist moisture and electrical breakdown; do not support fungus. Resistance to arcing, flame and electrolytic corrosion are also outstanding.

For more information, circle Reader Card No. 256

Greater Dependability In Fluid Couplings, Springs and Gauges with Silicones

Dow Corning silicone liquids retain near-constant viscosity over an operating temperature span of -130 F to 400 F. They resist gumming, oxidation and breakdown due to shear; will not attack or corrode metals. As power transfer or damping media, silicone fluids contribute to effective functioning of such components as torque transmissions, liquid springs, gauges, hydraulic controls and torsional vibration dampers.

For more information, circle Reader Card No. 257

Performance at High Temperatures with Silicone Dielectrics

Available in a range of physical forms including rubbers, molding compounds, fluids, resins, varnishes, enamels, and greaselike compounds, silicone dielectrics serve as effective and durable coating, bonding, impregnating, sealing, filling, encapsulating, and insulating materials. All of the various physical forms are characterized by a high degree of heat stability, resistance to oxidation and moisture, and retention of physical and dielectric properties even after long periods of service at elevated temperatures.

For more information, circle Reader Card No. 258

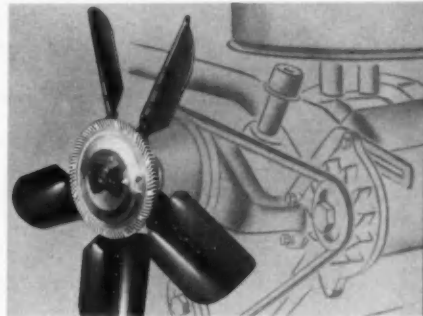
Longer Service Life with Silicone Lubricants

Silicone lubricating oils and greases perform well in such varied applications as bearings and pivot points, speedometers, steering linkage, cranking motors and rubber couplings. Basic advantages include long-term lubricity at temperatures of -100 to 500 F, near-constant viscosity or consistency, and high resistance to oxidation and gumming. In some instances these silicones make lifetime lubrication possible.

For more information, circle Reader Card No. 259



Silicone-glass laminates shield against heat—retain structural strength, eliminate necessity of replacement. This drag chute case fits against jet engine at rudder base, cuts temperature from as high as 450 F to less than 200 F.

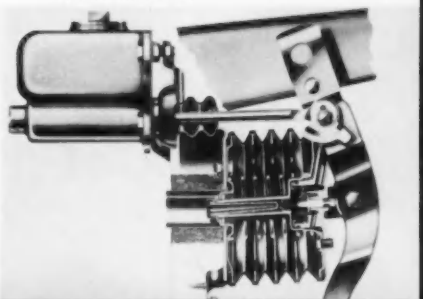


Eaton Manufacturing Company specifies a Dow Corning silicone fluid for its temperature sensitive Visco-Drive for cooling fans. The unit produces exact cooling—more at low speeds, less at high speeds—despite temperature variations.



AiResearch Mfg. Div., Garret Corporation, uses silicone insulation and grease in this tiny a-c motor to achieve miniaturization, reliability and longer service at temperatures from -65 to 300 F.

Kelsey-Hayes Company silicone-lubricates rubber diaphragms and seals of truck, bus, car power brake units. Parts are protected during production and storage; are easier to handle in assembly; service life is extended.





SPECIFY SILICONES

FORMS:	FOR:
rubbers	resistance to
resins	heat, cold,
fluids	oxidation, weathering,
lubricants	moisture, oils,
dielectrics	corrosion, fuels,
laminates	solvents,
paints	low pressure steam,
adhesives	most chemicals.
defoamers	Also light in weight,
additives	dielectrically stable.

Whether working to increase the efficiency of an existing plant or designing an automated installation for tomorrow, production engineers find Dow Corning Silicones provide practical answers to many operational and maintenance problems. Examples of how silicones are now serving in different areas of production and maintenance are cited in these pages.

In your search for better, more economical production methods, don't overlook the savings in time, labor and money to be gained with silicones.

Longer-Lasting Surface Protection with Silicone-based Paints

Maintenance paints made with Dow Corning silicone resins readily take temperatures up to 1,000 F, provide excellent protection against weathering and corrosive atmospheres, maintain good appearance through fine retention of gloss and color. Because silicone paints last longer, repainting costs are materially reduced. In some cases, production costs can be lowered through application of silicone coatings to metal before parts are formed.



This bronze-melting furnace at Saginaw Bearing Company is painted with a silicone-based aluminum coating. Surface temperatures in the range of 650 F caused organic coatings to blister and peel—frequently within hours after application. The cured-in-service silicone finish applied over six years ago remains in near-perfect condition.

For more information, circle Reader Card No. 260

Step Up Performance and Reduce Downtime with Silicone Electrical Insulation

Machine tool motors that consistently take the strain of reversing duty and heavy overload without failure! Impossible? Not if they're silicone insulated.

Resistance of silicone insulating materials to heat, oxidation, moisture, dust and corrosive materials makes it possible for light equipment to do heavier duty — to meet increased production. Motors, transformers, generators, insulated with Dow Corning Silicones, keep increased production on schedule, keep downtime and maintenance to a minimum.



Rewinding with silicone insulation increased reliability, versatility of this 250 ton press at Brooks and Perkins, Detroit metal fabricator. Previously, overloads due to slow speeds and repeated starts, plus high ambient temperatures from a flame used to soften aluminum or magnesium during stamping, caused motor burnouts in short time. Rewinding with silicone insulation increased capacity 32 percent to equal that of a 330 ton press — ended motor failures.

For more information, circle Reader Card No. 261

Extend Equipment Service Life, Cut Cost with Silicone Lubricants

Dow Corning silicone oils and greases feature long lubricating life at temperatures from -100 to 500 F, relatively constant consistency, and high resistance to oxidation and gumming. Such properties make operating efficiency a "sure thing" for bearings, valves, oven thermostats, power tools and other components forced to work in high ambient temperatures.



Ford Motor Company eliminated bearing failure in core oven conveyor lines with a Dow Corning silicone grease. Each line has more than 1200 roller bearings which are subjected to heat up to 700 F for 2½ hours out of every 4. Organic lubricants ran off in a short time. Despite relubrication every cycle, bearing failures, with their high cost downtime, were frequent. In 1948, Dow Corning 41 Grease went to work. Since that time, only silicone lubricants have been used, and core production has run smoothly.

Typical Properties of Dow Corning 41 Grease

Color	Black
Penetration ¹ , W60	260-300
Dropping Point	None
Bleed ² , percent	
after 24 hours at 300 F	4.0
after 24 hours at 400 F	6.0
Evaporation ² , percent	
after 24 hours at 300 F	1.0
after 24 hours at 400 F	7.0
Operating Temperature Span	0 to over 450 F
Bearing Speed Factor (bore size in mm x rpm):	75,000

¹ ASTM D217-52T

² Under the same conditions, two typical high temperature organic greases showed total losses by bleed and evaporation of 5.8 and 16.3% at 300 F; 23.2 and 39.8% at 390 F.

For more information, circle Reader Card No. 259

Increased Machine Efficiency with Silicone Defoamers

Added to coolants and cutting oils, Dow Corning anti-foamers or defoamers eliminate slow-downs needed to let foam settle; reduce clean-up maintenance due to overflows; make possible maximum utilization of machine capacity. Effective at extremely low concentrations, silicone antifoamers are nontoxic and completely harmless to equipment, materials and operators.



For more information, circle Reader Card No. 262

One midwest auto parts plant was so seriously plagued with coolant foam on grinding operations that grinders were shut down 15 minutes every hour for foam clearance. The addition of about one part silicone antifoamer to 4000 parts of grinder coolant now prevents foam before it starts; enables operators to run grinders at full capacity.

Troublesome sticking in shell molding operations is prevented, castings are held to closer tolerance, mold maintenance is cut with silicone parting agents.



Reduce Time and Labor Costs with Silicone Parting Agents

Dow Corning Silicones are used as release agents in production molding of glass, rubber, metal and plastic parts . . . play a key role in efficiency of shell mold method of casting metal parts. These silicone parting agents give clean, easy release, improve surface finish, reduce scrap — are easily applied and effective at low concentrations. Because they are heat-stable, and do not break down to form carbonaceous build-up on molds, silicone release agents cut mold cleaning and maintenance costs — do not stain light-colored parts.

Other anti-adhesives that serve industry include silicone coatings for paper and paperboard. Paper coated with Syl-off® prevents the adhesion of sticky materials such as asphalt and unvulcanized rubber — in packaging and processing operations — saves time and material.

Available from approved mills and converters in the form of bags, containers, drums, interleaving paper, paperboard, liner materials and sheets.

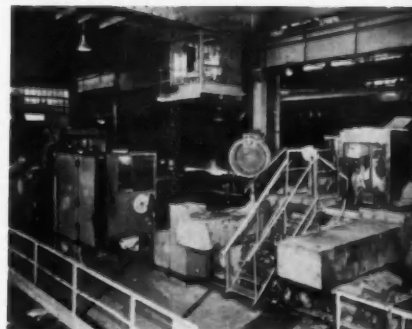
For more information, circle Reader Card No. 263

For Lasting Resiliency, Reliability --Silicone Rubber

For severe-duty production applications, Silastic, the Dow Corning silicone rubber, has many advantageous properties worth investigating — serviceability over a temperature span from -130 to 500 F; resistance to humidity, corrosive gases, ozone. Included among Silastic's in-service uses are tape and sheet insulation for electrical equipment; flexible heating elements for warming drums and process piping; encapsulating compounds; coatings for conveyor belts; seals, O-rings, gaskets and diaphragms for "hot spots". Such parts of Silastic stay on the job almost indefinitely, cutting costs, increasing productivity.

For more information, circle Reader Card No. 264

Cables run under two re-heating furnaces in Kaiser's rolling mill at Fontana, Calif. . . are subject to both heat and moisture. Burn-outs were common on previous lead-covered cables; required 6 to 8 hours of downtime to repair. In 1951, cable covered with Silastic was installed; is still in service with no burn-outs to date.



...for research, development, design, engineering, production, and maintenance

A NEW VERSATILE TOOL... SILASTIC RTV

Silastic RTV, the Dow Corning silicone rubber that vulcanizes at room temperature, is a new material that's proving to be a practical, versatile tool in all areas of engineering — from research through service shop.

Currently available in two basic types — one fluid and one nonflowing — Silastic RTV provides you with a simple way of making a variety of rubber parts and components, an easy means of producing prototype parts, an effective potting and encapsulating material, a material that effectively seals, caulks, bonds and fills.

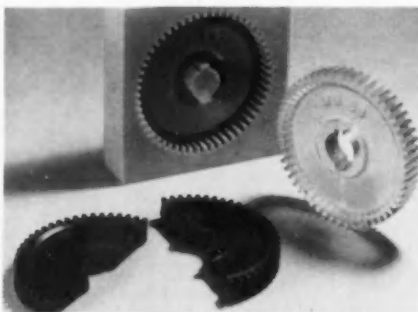
The fluid forms of Silastic RTV flow and conform to the finest detail, then vulcanize at room temperature to a resilient solid that remains flexible and rubbery through temperature extremes and adverse environments. Forms or molds made of Silastic RTV provide easy, natural release and fine reproduction of detail. Simplicity of use makes this material particularly suitable

for hard-to-get-to areas and for applications where heat cannot be tolerated.

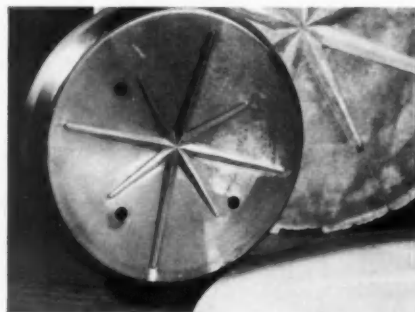
Typical automotive applications of fluid type Silastic RTV include: poured-in-place gaskets, seals and fillers to remedy equipment defects and reduce downtime; encapsulating and potting delicate, sensitive electronic and electrical equipment; and producing flexible molds for casting prototype parts. Other uses include: caulking, jacketing, filling, insulating and potting.

The nonflowing type Silastic RTV is an excellent tool in many applications. It does not slump but stays where it is placed, and it adheres well to most clean surfaces. It serves to caulk and fill areas where a heat-stable, resilient material is desirable, seals out moisture, and serves as a dielectric that also insulates against vibration and shock. This type Silastic RTV is a practical, handy material that will soon find applications so numerous that a tube of this material will be included in every service man's kit.

For more information, circle Reader Card No. 255



Make Emergency Repairs or Replacements . . . with parts made of Silastic RTV or parts cast in molds of Silastic RTV.



Measure Customer Reaction to Proposed New Designs . . . by making prototype parts, easily, quickly, with Silastic RTV.

For more engineering data about silicone materials and products, or for assistance in adapting silicones to your design or production application, contact the technical representatives in the Dow Corning office nearest you.

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NEWS

Vol. 123, No. 4

August 15, 1960

Down Time Varies

Some Plants Closed Month for Changeover

By **Hugh C. Quinn**, Detroit Regional Editor,
and **C. B. Campbell**, News Editor

Spring housecleaning comes late in the automobile industry—matter of fact, it comes in the middle of summer, along about August. This is when the industry builds out the last of one model year and gets ready to start up full blast on the new year.

Model changeover time is the chance every plant manager has been waiting for to clean up, paint up, fix up, even if the changes in his particular product are minuscule. Throughout the industry, it's the period when inventory is taken, when plant equipment is inspected and repaired, and when new equipment is installed.

Some Halt Output

The actual down time for assembly lines varies—this year from no time at all to more than a month. Some major changeover projects, such as installing multi-station transfer machines, can be completed only when production is stopped. Other less complicated projects can be done without interrupting production.

Changeover in the manufacturing plants came ahead of the assembly line conversion. Most Fisher Body plants, for example, began 1961 production before their com-

plementary assembly plants built out '60 production.

Some 1961 plant conversion began months ago, and is just being brought to completion during the final weeks before actual production begins. For example, Buick began installing a new V-8 engine block machining line nine months ago right alongside the regular engine line. Because the lines are separate, work on the 1960 engines was never interrupted while new pits were dug, new machinery installed, and testing carried out. The new engine is for the Buick

BRITISH HAVE CUSHIONCRAFT



Developed by Britten-Norman, craft hovers 12 to 15 in. above ground or water with lift provided by annular compressor rotating about periphery of 19-ft circular ship. Rotor with 40 aerofoil blades is supported by rollers. Drive from a 170-hp Coventry Climax racing engine is through friction wheel at rear of hull. Twin propellers can be pitched simultaneously for forward or backward motion, or differentially for steering. Vehicle weighs one ton.

UNIQUE TRUCK TO SUPPLY 'DEW LINE'



Four-inch-thick Goodyear conveyor belts mounted over tires enable this "monster" to ply tundra north of the Arctic Circle in Alaska. The truck, with a capacity of eight tons, will haul supplies for 2½ months each year. It was manufactured by Wagner Mining Scoop Co., Portland, Ore.

Special and Oldsmobile F-85 compact cars.

Buick also put in a new assembly line for the Special. Buick remodeled a section of its sheet metal stamping plant to house the new line, which runs 3534 ft and covers 395,000 sq ft on three floors. The line was two years in the planning stage and eight months in construction. Presses from this wing of the building were relocated in other areas.

Job One came off the new overhead assembly line Aug. 1.

Pontiac Job Easier

Pontiac's task, on the other hand, was considerably simpler, since the compact Tempest is being worked into existing manufacturing and assembly facilities. One of the division's two cylinder block machining lines is being adapted for production of the four-cylinder engine for the Tempest, the other line is being held for V-8 output. With fluctuations in volume, however, the single-bank line could be used for either engine, with minor alterations.

On the assembly line, the body drop area is being relocated to accommodate the Tempest—wheels will be mounted on the Tempest chassis after the body is in place,

instead of before the body drop. Other plant changes include installation of a belt sander to finish the ⅝ in. diameter propeller shaft, and equipment for manufacturing Tempest differential parts in the axle plant.

Ford Changes Routine

Most of the changeover projects at Ford Motor Co. are routine. The Thunderbird will be worked into the single assembly line at the Lincoln plant at Wixom, Mich. This will involve new fixtures, welding equipment and tooling, and a revamped body buck area.

Complete new bodies for both Thunderbird and Lincoln-Continental call for new dies in Ford's stamping plants, where the Thunderbird bodies will be built for 1961 models for the first time. New sheet metal on Ford and Mercury cars also required new dies, jigs, fixtures and bucks.

Ford's compacts, Falcon and Comet, will not demand much time for model changeover, and the most that will be lost will be two days at the San Jose Falcon plant. Other plants will shut down Friday, Aug. 26, and resume output the following Monday.

The most extensive conversion at Chrysler Corp. was in the Los An-

geles plant, which was set up for both Lancer and Valiant production. The major task was modifying pedestal conveyors to accommodate the shorter wheelbase. Los Angeles also is building '61 Plymouths and Darts.

Most of the alterations at Chrysler involved new welding equipment and assembly tools required for changes in the body-in-white. Throughout the car and truck assembly group, Chrysler installed 71 new gun-welding stations, making a total of 2582 stations used in the corporation's body build-up areas.

In addition to Los Angeles, the Hamtramck, St. Louis and Newark, Del., plants were set up for Lancer production.

New engines at the two independent auto makers called for extensive changeovers. American Motors installed a new multi-station transfer machine for the cylinder head line for the new OHV six (see AI, Aug. 1, Page 39).

Old Equipment Used

Studebaker-Packard's new engine will put to work some old Packard equipment that has been gathering dust since the Packard plant in Detroit was closed five years ago. S-P sent three machine tools back to their manufacturers for reworking, and the result is a 211-ft 68-station machining line for the cylinder head. New equipment also has been installed for washing, testing and final reaming of the head.

A new 52-ft, 22-station transfer machine was installed for part of the block machining operations, including drilling and tapping head bolt holes, accessory mounting holes, and drilling and reaming valve pusher holes and oil holes.

Profits on Compacts Cut Most Earnings

All five U. S. automobile companies showed profits during the first six months of 1960, but compact cars left a definite impression on the half-year dollar results. Only American Motors gave a really encouraging earnings report for the period ended June 30.

Earnings at Ford, Chrysler and Studebaker-Packard were below the 1959 level. General Motors' earnings were higher than last year, but the gain in profits did not keep pace with the gain in dollar sales. Chrysler showed a drop in earnings despite an increase in both dollar sales and net sales. Ford's drop in both earnings and dollar sales came despite a good boost in unit sales of cars and trucks.

Studebaker's unit sales were down, reflecting in dollar sales and earnings.

The answer is the lower profit margin on the compact cars and lower-priced cars that are selling in volume.

Chrysler is a good example. A year ago, Chrysler sold 539,554 passenger cars during the first six months, for \$1531 million, and showed a net profit of \$58 million, but earnings dropped to \$23.7 million.

A year ago, Chrysler's only entry in the low-priced field was Plymouth, which accounted for seven per cent of total domestic retail sales. This year, Valiant, Plymouth and Dodge Dart accounted for the bulk of the corporation's sales and 13 per cent of the total retail market.

So it appears that Chrysler guessed right on the 1960 market

trend, and concentrated its efforts in the low-priced field. As a result, sales are up but earnings are down.

Ford passenger car sales rose from 948,232 a year ago to 1,016,385 in the first six months this year. Trouble is, 343,721 units sold this year were compacts that didn't exist a year ago, while the company lost sales of nearly 280,000 higher price Ford and Edsel cars from last year.

So Ford's net income dropped 7.4 per cent from \$286 million a year ago to \$265 million, while dollar sales dropped 2.4 per cent from \$2954 million to \$2884 million.

GM's dollar sales went up 8.4 per cent, from \$6512 million to \$7,109 million, but net income went up only 3.6 per cent, from \$590 million to \$612 million. A year ago, earnings were more than nine

per cent of sales. This year they were down to 8.6 per cent of sales.

In GM's case, however, other factors enter in, since the compact Corvair represents a smaller slice of total production than the Ford or Chrysler compacts.

AMC, meanwhile, posted a new sales record in the three-month period ended June 30. The company had net earnings of \$17.1 million on sales of \$310.4 million. A year ago, the company posted earnings of \$16 million on sales of \$266.2 million.

Studebaker-Packard sales in the first half totaled \$178 million, with net income of \$3.3 million. A year ago, before the Big Three brought out their compacts, S-P had sales of \$209.8 million and earnings of \$12 million.

VOLVO'S 1960 122 S SEDAN



Swedish four-door, five-passenger sedan is powered by four-cylinder, overhead valve engine which develops 85 hp at 5500 rpm. Top speed is about 95 mph.

NEWS

CONTINUED

Imperial Planning Bigger Sales Year

The compact car has not hurt the luxury car market, and Chrysler and Imperial Div. is planning a bigger sales year in 1961. C. E. Briggs, corporate vice president and general manager of the division, says Imperial retail deliveries for the 1960 model year will be the second highest in the car's history.

He forecasts sales of 24,000-26,000 Imperials and 110,000 to 120,000 Chryslers during the 1961 model year.

"Our conviction is that the full size luxury automobile is an important part of the American manner of living," reports Mr. Briggs.

There always will be a large group of persons who will want the roominess, quality and extra comfort of a big luxury car, he believes.

The '61 Imperial, incidentally, will feature free standing headlamps, according to Mr. Briggs. The chromed, pod-shaped lamps will be mounted in pairs on pedestal arms which rise above the gravel deflector panel. Mr. Briggs describes the new headlamps as a further development of the styling theme introduced by Imperial in 1957, yet a deliberate departure from the "all new" experimental era in luxury car design.

The '61 Imperial headlamps are reminiscent of the lights used on the "classic" cars of the 1920s and early 1930s.

MODELING HEADLAMPS FOR 1961 IMPERIAL



Clare E. Briggs, vice president and general manager, Chrysler and Imperial Div., watches Rod Leighton put finishing touches on clay model of '61 Imperial headlamp. They will be the first free-standing lamps to appear on a U. S. car in a quarter-century. Imperials will be shown in late September.

Ford Branches Out, Makes Fork Lifts

Ford Tractor and Implement Div. has branched out into the lift truck field with a heavy duty fork lift truck to be sold and serviced by the division's 2500 dealers. The Series 4000 fork lift is equipped with a 172 cu in. displacement gasoline or Diesel engine and stacking heights of 1, 12, 16 or 21 ft, and two or three-stage masts. The 10 and 12 ft lift trucks can handle loads of 4000 lb.

L. E. Dearborn, general sales manager for the division, said the new fork lift is the result of a joint effort by Tractor-Mate, Inc., of Marshall, Mich., and the Ford Engineering Group.

The unit features a low center of gravity, power steering and excellent wheel flotation on uneven or wet ground, according to Mr. Dearborn. It is primarily an outdoors hauler, but can be used for inside jobs.

Autolite, Hiller In Merger Agreement


A tentative merger agreement has been reached by Hiller Aircraft Corp. and Electric Autolite Co. Under the merger terms, Autolite would take over Hiller's assets and exchange one Autolite share for each 4½ shares of Hiller stock.

The merger agreement, already approved by directors of both companies, will be presented to stockholders for their action.

Autolite said its new Aero Space and Special Products and Research and Development Divs. would cooperate in research and development of ceramics, electro-hydraulics and electronics, fields Hiller is not equipped to handle.

Correction Notice

In the caption accompanying the drawing reproduced on Page 19 of the July 1st issue of this news section showing a V-4 engine of Russia's new small Zaporozhe, a credit line should have appeared mentioning the source as, "The Autocar," London, England.



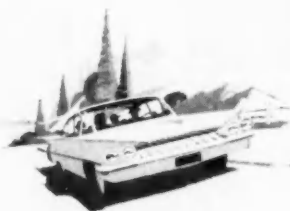
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Circle 131 on Inquiry Card for more data

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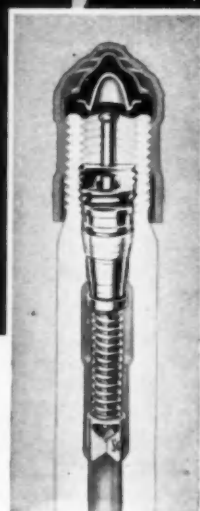


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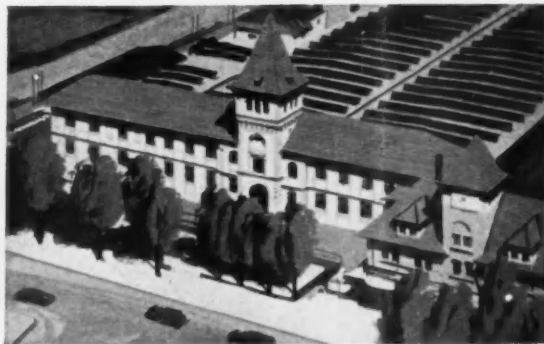


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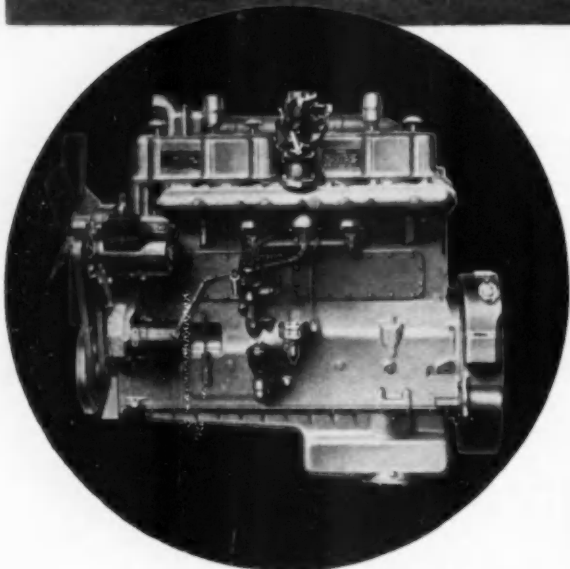
FOR ORIGINAL EQUIPMENT AND REPLACEMENT

On the milk run

...OR ANY RUN



PETERBILT truck—tire size: 10:00 x 20; rear axle ratio: 5.91; gross vehicle weight: 76,800 lbs.—is powered with Waukesha 145-GZB engine.



Waukesha 145-GZB High Output Gasoline Engine, 5 $\frac{3}{8}$ -in. bore x 6-in. stroke, 817 cu. in. displacement, up to 260 hp at 2400 rpm.

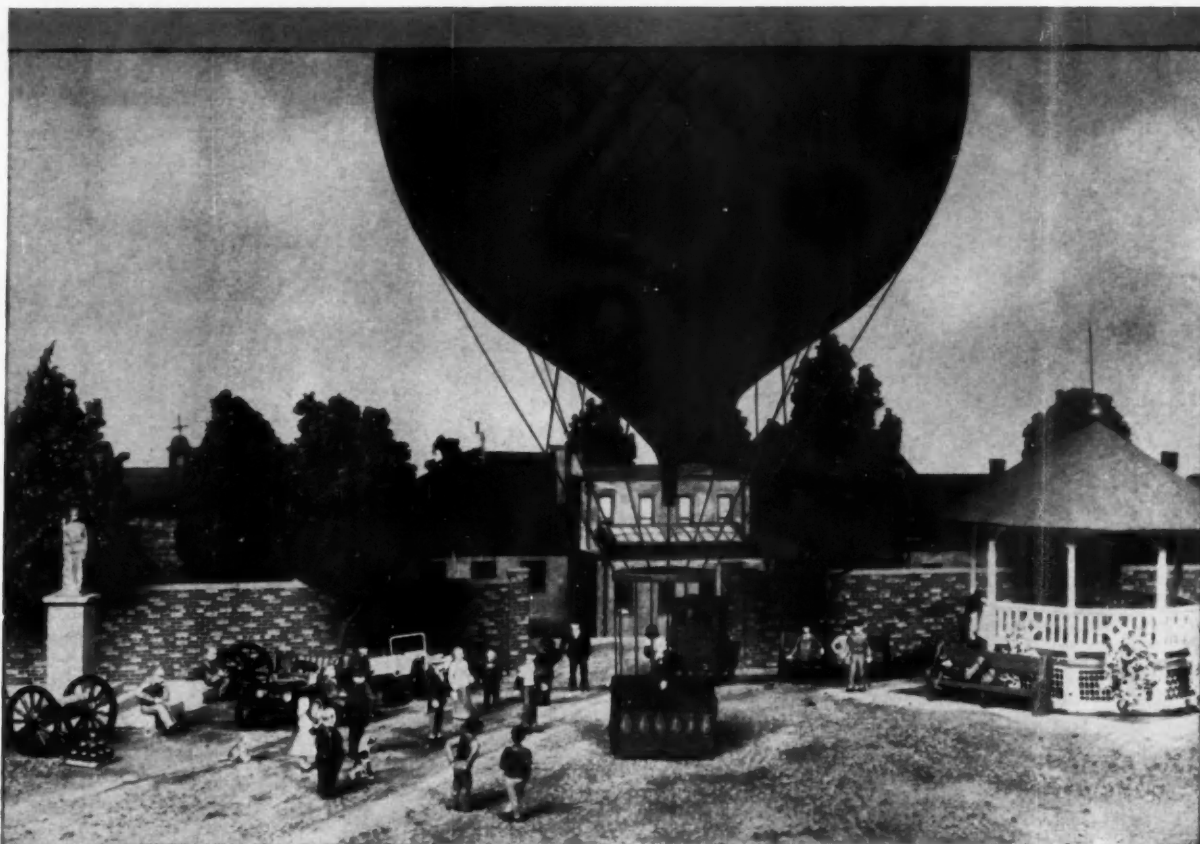
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Short runs or long hauls—the pay-off is on pay-load that gets there faster. A rare combination of extra power plus extra speed, with rugged reliability—the Waukesha 145-GZB High Output Engine keeps trucks on schedule with day-after-day all-ways-dependable regularity. It's a high compression, overhead valve gasoline engine with interchangeable cylinder heads, removable wet sleeve cylinders, water-heated intake manifold, vibration dampener, heavy-duty aluminum pistons, 7-bearing, 3 $\frac{1}{2}$ -inch crankshaft fully counterbalanced and many other fully-proved features, all detailed in Bulletin 1553.

436



Are you up in the air over tubing sources?

If you have ballooning production problems, consider these important facts. OSTUCO Tubing is always the exact tubing you need for your product because OSTUCO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application — the precise grade, analysis, size, shape, special anneal and tolerances best suited to your needs.

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To get the most from your next steel tubing order, use Custom Made OSTUCO Tubing. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.

Model illustrated built to 3.5 mm scale.



A-3449A



OHIO SEAMLESS TUBE

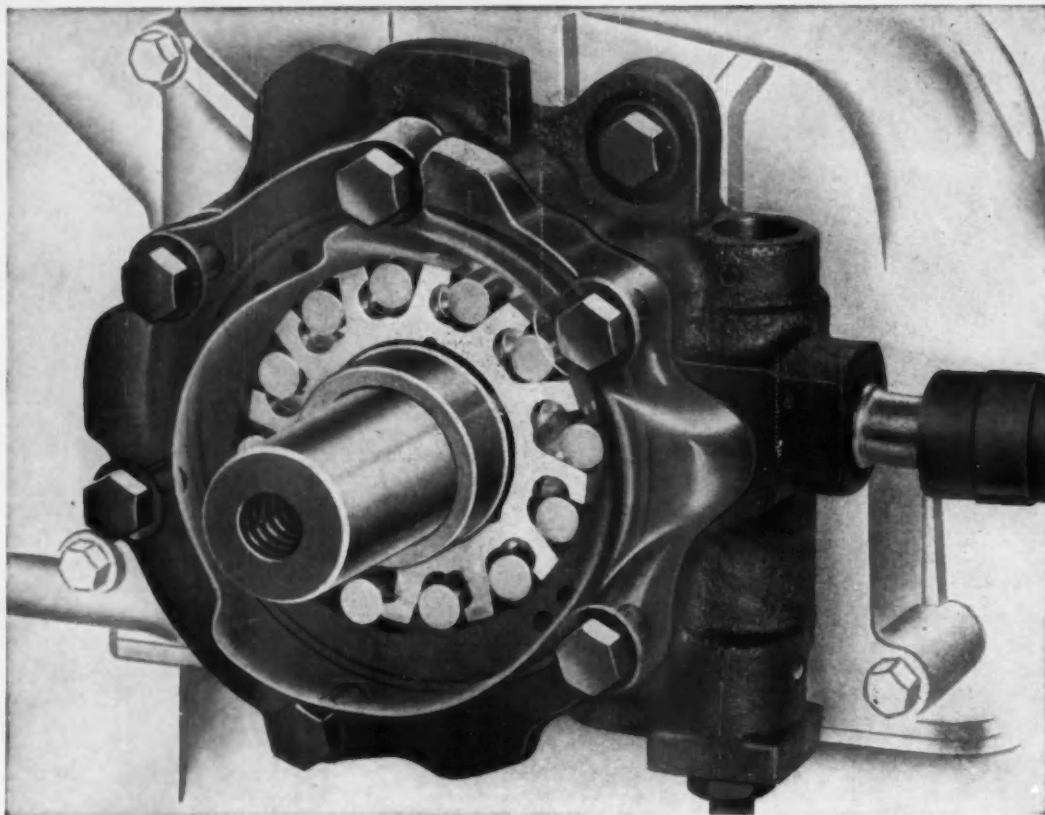
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The Eaton Crankshaft-Driven Pump is an advanced version of the basic Eaton Roll-Pump design which has been performance-proven in operation on many leading passenger cars, motor trucks, and tractors. High efficiency, dependability, quiet operation, and low cost maintenance are tangible benefits inherent in this design.

If you are concerned with improving steering performance while cleaning up engine front end design and gaining additional under-hood space, call on us. Your inquiry will receive immediate attention.



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NEWS

FEATURES

Gas Turbine Speeds Landing Vehicle

Conversion of an amphibious landing vehicle to gas turbine power at Jered Industries, Inc., Detroit, is said to boost the craft's payload 5000 lb and increase its speed by 30 per cent.

The performance figures were announced by General Electric Co. when it revealed shipment of the tracked vehicle's new powerplant, a GE Model 720 gas turbine engine weighing 50 per cent less and occupying one-seventh the space of

the reciprocating gasoline engine it replaces.

The turbine-powered craft is a conversion of the versatile Marine Corps LVTP-5 personnel and cargo carrier. Jered is building the prototype for the Navy's Bureau of Ships.

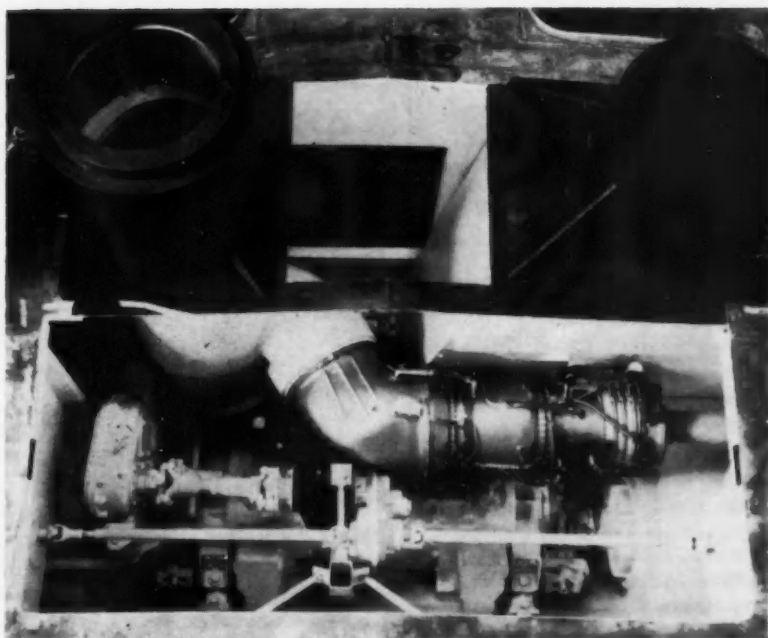
Total weight of the engine-transmission package is less than 3200 lb compared to the more than 6500 lb of equipment replaced. Space occupied by the turbine engine is only nine cu ft as compared to 65 cu ft for the reciprocating powerplant.

Reduced size of the propulsion equipment above and parallel to the transmission allowed moving the engine compartment bulkhead aft five ft which enlarged the cargo volume by 210 cu ft or 33 $\frac{1}{3}$ per cent. The converted craft will carry 46 fully equipped troops while the vehicle it replaces transports 34.

The 30 per cent speed increase of the 85,000-lb 29-ft vehicle was credited to more favorable torque characteristics of the turbine and higher transmission efficiency.

GE engineers explain shaft output from the 900 hp turbine will be reduced to 6000 rpm through an engine reduction gear and then dropped through an additional gear train to a parallel shaft below the engine. This shaft drives into the main transmission through a set of bevel gears at approximately 5500 rpm. The main transmission in turn engages the vehicle's two tracks.

Intake air for the turbine enters through a snorkel-type stack on top of the craft and reaches the engine compartment through a self-cleaning air cleaner. The exhaust is discharged through a similar snorkel-type duct on the opposite side.



Gas Turbine Powerplant of Landing Vehicle

Iron Founders' Officer

John E. McIntyre, vice president and general manager, Sibley Machine and Foundry Corp. has been elected vice president of Gray Iron Founders' Society.

AI TABLOID

Results of a three-year Air Force-sponsored study of corrosion in jet engines using boron fuels have been released. Also available are three metallurgical reports on the effects of heat treatment on titanium alloys, strength and ductility relationships in titanium-aluminum alloys, and creep resistance recovery of pure aluminum.

* * *

A motor oil has been developed containing a nickel chemical that helps to prevent wear on automobile engine parts.

* * *

New nickel-containing austenitic ductile irons continue to be used in increasing amounts for manifolds and turbochargers on heavy duty Diesel engines.

* * *

Three electrical and semiconductor research reports have been released through the Office of Technical Services, Business and Defense Administration, U. S. Department of Commerce. One report investigates impulse-voltage breakdown in polyethylene and another contains a calculation of transient discharges between separating contacts. The third is a study of the physical chemistry and metallurgy of semi-conducting materials.

* * *

Air Force metallurgical researchers have compiled three reports on the influence of thermal stress, structural testing, and beam vibrations.

* * *

A weekly review of scientific and technical articles appearing in the Soviet press and of significant new Russian books is being published by the U. S. Department of Commerce. The reviews cover the fields of metals, ceramics, electronics, use of ultrasonics, mechanical engineering, aviation, radioactivity and radiation in industry, oceanography and meteorology, and space activities.

Some 250 commodity categories have been added to the list of items which may be exported to the Soviet Union and her European satellites without applying for individual export licenses. Added to the list were automobile radio receivers; dental, medical and surgical apparatus; printing presses; building supplies; and ores and metals such as lead, tin, zinc, antimony and chromite.

* * *

Five technical memorandums prepared by the Defense Metals Information Center, Battelle Memorial Institute, have been released to industry by the U. S. Dept. of Commerce. The center was established at the request of the Assistant Secretary of Defense to provide information on beryllium, titanium, refractory metals, high strength alloys for high-temperature service, corrosion and oxidation resistant coatings, and thermal protection systems.

* * *

Shipments of galvanized steel sheets during the first quarter of 1960 were at an all-time high of 942,096 net tons. This is an eight per cent increase over 1959. Shipments of galvanized steel sheet to the automotive industry rose by 13 per cent to 57,472 tons.

* * *

State highway-user taxes collected in the U. S. passed the \$5 billion mark for the first time in 1959 to set a new record. The 1959 total was \$5.1 billion, a gain of 8.3 per cent, according to the Bureau of Roads.

* * *

A current revision of the Air Research and Development Command's manual of atmospheric data, based on recent rocket and satellite experiments has been compiled. Also completed is a Navy annotated bibliography on the growth and development of upper atmosphere research with rockets.

Gordon Patterson Heads Yale & Towne

Gordon Patterson, a former steelworker, has been elected president of Yale & Towne Mfg. Co. Mr. Patterson, who is 57, attended college at night after family illness halted his studies at Wooster College, Ohio.

Mr. Patterson resigned in April as president of Square D Co. He had held that post since 1955 following Square D's merger with Electric Controller and Mfg. Co., of which he was president. He is a director of Square D and of National Malleable & Steel Castings Co.

Mr. Patterson succeeds Gilbert W. Chapman who retired after 11 years as president and director of the lock, hardware and materials handling equipment manufacturer.

1st Half Air Traffic Shows 7.8 Pct. Increase

A 7.8 per cent traffic increase on domestic trunk airlines has been reported for the first half of 1960 by the Air Transport Association.

For the first time, June coach revenue passenger miles equaled first class revenue passenger miles. If this trend continues, industry officials say, air coach flights will become the leading service offered by airlines.

The 12 domestic trunk airlines reported 14.4 million revenue passenger miles for the 1960 period as compared with 13.4 million for the 1959 period.

Coach traffic rose 18.6 per cent to 6.7 million revenue passenger miles while first-class revenue passenger miles showed no rise over the 1959 figure.

U. S. Challenges For Harmsworth

For the first time in 40 years the United States is challenging instead of defending for the British International (Harmsworth) Trophy.

Three craft have been selected to attempt to return the trophy to the U. S. in the best of two of three races on Long Beach, an arm of the Bay of Quinte at the eastern end of Lake Ontario on Aug. 19 and 20, and if necessary, Aug. 22. One Canadian entry is expected to attempt to keep the trophy in Canada.

1000 HP Added To Thompson Racer

An additional 1000 hp will be under the hood of the automobile Mickey Thompson hopes will carry him to a new world land speed record at the Bonneville (Utah) Salt Flats.

Thompson has announced that use of superchargers on his Challenger I boosts the total horsepower of the four Pontiac engines above the 3000 mark.

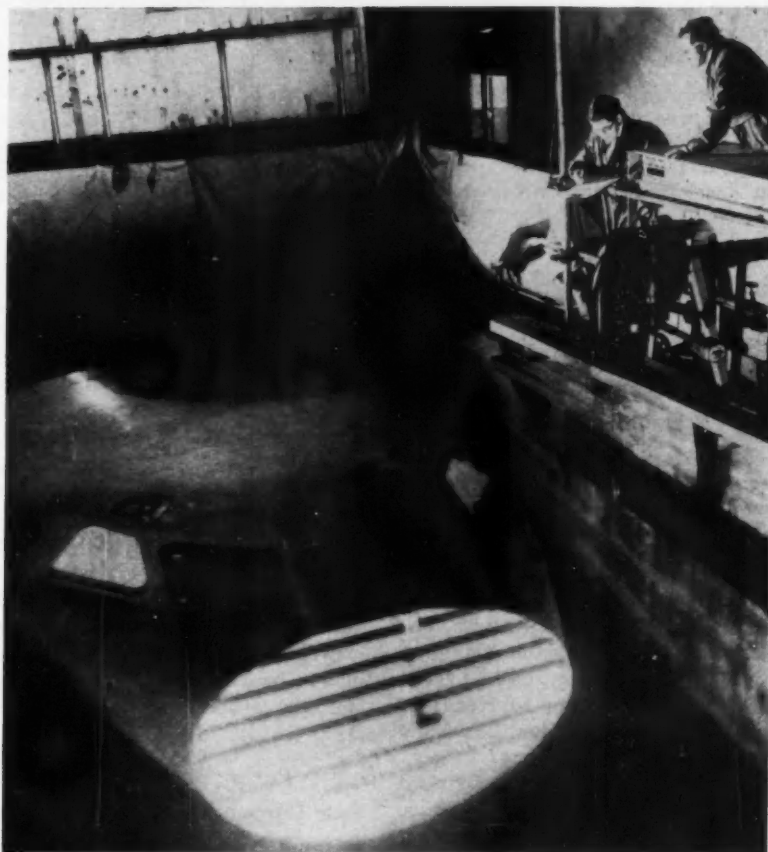
Last year, he roared to an American land speed record of 363.4 mph over the Bonneville Flats. His four engines were then capable of 2400 hp.

Thompson's August goal is the magic 400 mph mark which would put him beyond the world record of 394.2 mph established by the late John Cobb of England in 1947.

"The supercharger will help," Thompson said. "So will some of the body design changes we've incorporated to make the car as aerodynamically perfect as possible.

"The front tires will be completely covered this year to help us cut

STATIC AND PRESSURE TEST



Nose section of Airco DH 121, a new short-haul jet airliner, undergoes tests in water tank at de Havilland plant in Hatfield, England. Powered by three rear-mounted Rolls Royce by-pass jets, one at top of fuselage, the craft is designed to take off from runways of less than 6000 ft.

down on wind resistance which is vitally important at high speed."

The tires, developed by Goodyear Tire & Rubber Co. especially for Thompson's use, have been machine-tested by Goodyear at speeds in excess of 500 mph.

"I had the equipment to do the job last year," Thompson said, "but got a bad break in the weather. This year, with more powerful engines and any kind of help from the weatherman, I feel certain I can break the record."

Larks in Haifa

The first Studebaker-Packard Lark and Hawk passenger cars have started rolling off the assembly line at the Haifa plant of Kaiser-Frazer of Israel Ltd. All major components were supplied by Studebaker-Packard from South Bend. The Haifa plant has a production capacity of 20 vehicles a day. Schedules call for 900 Lark and Hawk passenger cars and 400 Studebaker trucks.

EUROPEAN ROUND-UP

By DAVID SCOTT • Special Correspondent

Overproduction relative to mid-future demand is troubling some of Europe's auto manufacturers. Lagging sales of imports in America loom as a big worry.

Reduced British car shipments to the United States in June were not only a setback to the United Kingdom industry, but contributed heavily to the surprise slump in Britain's total exports that month, when the \$278 million trade gap was the highest in 3½ years.

Autos account for eight per cent of the country's exports, and the United States is by far Britain's largest foreign market.

There's also trouble at home, for the April credit squeeze that restricted consumer credit has brought an unseasonable slump in sales, even of some popular makes. A significant pointer to trends is the slashed prices for Vauxhalls initiated by some dealers.

Previously, a ny unauthorized lowering of the fixed selling figure would have brought swift disciplinary action from the manufacturer and the trade association. In Britain, the policy of retail price maintenance is observed as rigidly as anti-trust legislation—its opposite—is in America.

Dealers Overstocked

But this time Vauxhall was confronted by overstocked dealers whose cars weren't moving (partly because of an anticipated model change), and released them from the fixed-price clause in their contracts. This unprecedented move, if followed by other producers, could bring a U. S.-style competitive zest to the British auto trade which it has hitherto lacked.

While the outlook for passenger vehicles is hazy, British truck producers have few misgivings. Weekly output is now a third higher than a year ago, and there is a heavy backlog of orders both at home and abroad. Commercial vehicle sales got a boost when the United Kingdom purchase tax was abolished last year, and the credit pinch has so far had little effect since most buyers of trucks and buses are cash customers.

British tractors are booming too, and existing plans call for raising output from the present 160,000 a year to 200,000 by 1965. The United Kingdom also is the No. 1 exporter in this field, where its strength lies in concentration on a narrow range of versatile, medium-powered Diesel machines as exemplified by Ford and Massey-Ferguson, the leaders.

Parts Boom Likely

If European car sales in America are dwindling, prospects for the British auto industry are brightened by export possibilities of components. This was trail-blazed by U. S. Ford in orders for Falcon parts placed with four different companies. These involve some \$1.4 million worth of leaf springs from Toledo Woodhead, as well as steering wheels, clutch release bearings and wiring.

The Toledo Woodhead contract, covering rear springs to meet a daily production of 400 Falcons for a two-year period, was won against strong French and German competition. The company believes this is a major breakthrough for British parts makers.

Its delivered prices are report-

edly still highly competitive even after ocean freight, duty and local transport costs are paid, so other United Kingdom producers could well be in line for similar orders.

Seeking Suppliers

It is understood that Ford and other American auto firms are seeking European suppliers for up to 20 per cent of their components and accessories, and have asked subsidiaries in Britain, France and Germany to suggest names.

On the design side, British auto makers have nothing revolutionary planned for their 1961 models. The London Motor Show in October will feature larger engines for several makes, and a new crop of station wagons. Something new can be expected from B.M.C.'s Princess prestige cars, since Vanden Plas, the Austin-owned producer of this make, has now been officially registered as a manufacturer.

Looking further ahead, B.M.C. is planning to adapt the transverse-engine front-drive layout of its successful baby cars to some of the larger ones in the Austin and Morris ranges. And Rover may have its gas turbine car in production by 1962.

The German industry, with no motor show of its own in Frankfurt this year, is marking time on new developments, and concentrating on production. Output during the first five months of this year jumped 31 per cent over the same period in 1959 for an annual rate of 1.9 million cars.

The main news from Germany is that Volkswagen has crossed the last legislative hurdle to denationalization. Europe's largest auto manufacturer now is a public company. Share capital is to be doubled, and 60 per cent of the shares will go on public sale early next year. The remainder will be divided between Western Germany and the state of Lower Saxony.

French vehicle production continues at a high level, although exports are lagging behind the 1959 rate. To boost its sales in Germany, Simca has signed an agreement with N.S.U. covering a reciprocal scheme for the distribution of its cars in the Federal Republic and of the smaller N.S.U. Prinz in France.

Cessna Plans Light, Twin-Engine Plane

Cessna Aircraft Co. plans to enter the light-light twin engine market with a new business plane of "completely different design."

Del Roskam, Cessna vice president of aircraft divisions, said the aircraft will represent a "basic new approach to twin-engine aircraft philosophy and will set a new pattern of thinking and engineering to meet the challenge of changing times and needs."

Mr. Roskam said the plane would carry four persons and would be noted for its safety and performance. "It will fly as simply and as easily as a conventional single-engine plane and will operate with a substantial margin of safety on either or both engines," he declared.

Cessna is building a prototype of the new model which is scheduled to make its maiden flight early next year. It is expected to be on the commercial market in 1962.

Cook Urges Start On Mach 3 Airliner

U. S. development of a Mach 3 airliner (about 2000 mph) is needed to continue our lead in commercial air transportation says Orval R. Cook, president of Aerospace Industries Association.

Mr. Cook declared that three other nations, including Russia, have indicated they are moving ahead on the project. "There is certainly no question that if Russia is first with a good supersonic transport, it will have a profound effect on our international stature," Mr. Cook said. "And they will have little difficulty in selling the aircraft, perhaps even to our American flag carriers."

"If the Russians beat us to development of a supersonic trans-

JET TRAINER LEAVES PRODUCTION LINE



First model of North American Aviation's T-39 Sabreliner jet trainer rolls from paint hangar at Los Angeles. The twin-jet, first of 42 ordered by Air Force, is undergoing flight test program at Palmdale, Calif.

port, there inevitably will be a flurry of action on our part to build a competitive aircraft. But it will be expensive. It is far less expensive, with the technological momentum we have today, to stay ahead in commercial aircraft development than to relinquish the lead and then try to regain it on a crash basis."

Mr. Cook said there is no doubt of the U. S. technical ability to develop the Mach 3 airliner. He pointed out there is a Mach 2 bomber in the Air Force inventory and considerable development work has been done on a Mach 3 bomber. All this provides a solid basis on which to proceed, he declared.



Largest tool steel component ever forged for rocket motors is this part produced by Wyman-Gordon Co. It weighs up to 841 lb and is 40 in. in diameter.

Fluid Power Society Elects Officers

Frank L. Mackin, chairman of Engineering Shops, General Motors Institute, has been elected president of the Fluid Power Society, a new technical organization serving the hydraulic and pneumatic power transmission fields.

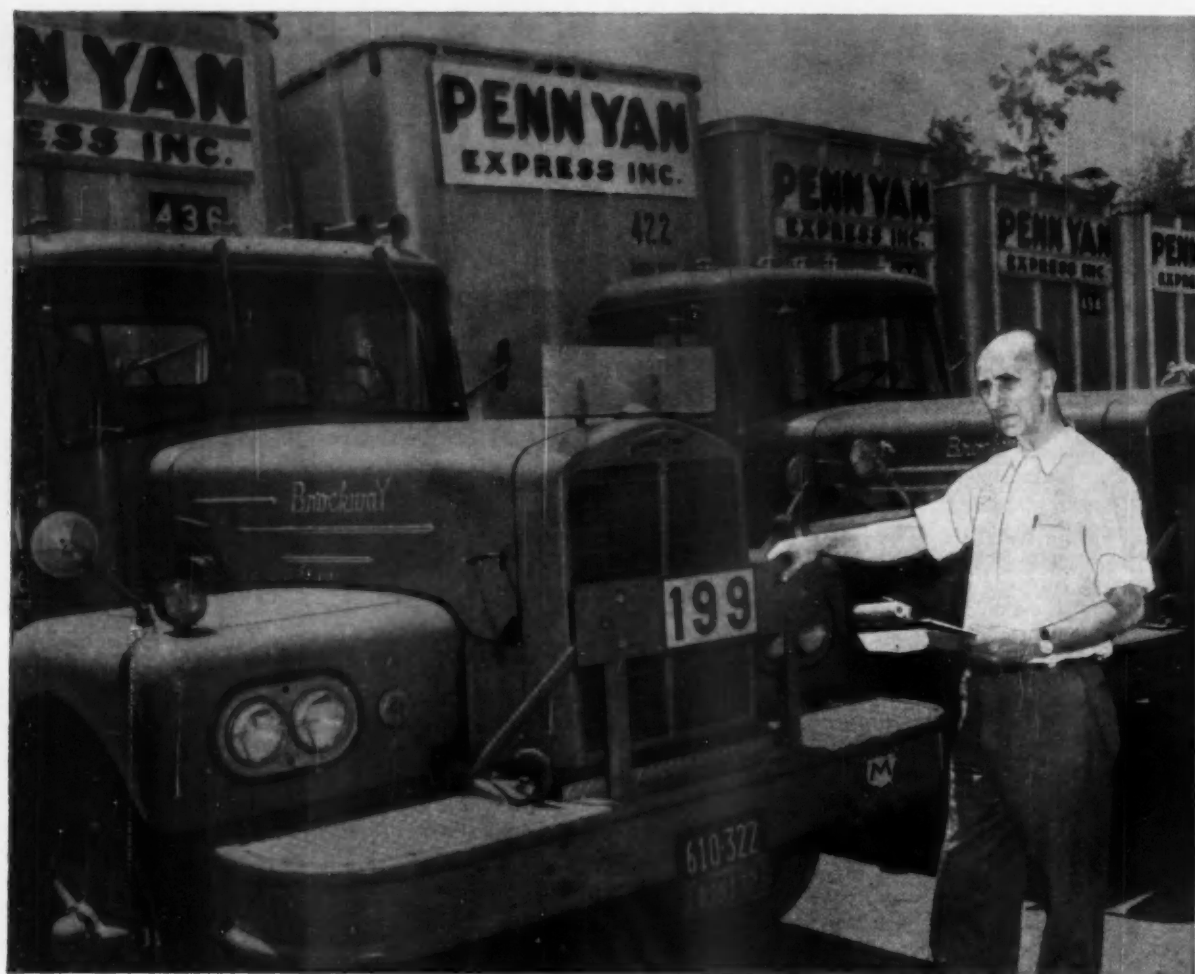
Other officers are Walter Ernst, vice president and director of engineering, Commonwealth Engineering Co., vice president; Allen Morris, treasurer, and Barrett Rogers, executive vice president and secretary.

The society members will meet Oct. 19 in Chicago a day before the 16th National Conference on Industrial Hydraulics.

Diesel Convention

More than 200 delegates, alternates and guests are expected at the annual convention of the Association of Diesel Specialists at the Sherman Hotel, Chicago, beginning Sept. 22.

Speakers will include experts on Diesel shop layouts, inventory control and repair standards, foreign Diesel equipment suppliers, and Diesel manufacturers. H. B. Sirotek is president of ADS.



“ LIPE CLUTCHES

play an important part in keeping this fleet rolling ”

Philo Edsall, Supervisor of Maintenance for Penn Yan Express, Penn Yan, New York, says:

“I recently took time out from regular duties to review our maintenance records in order to determine which replacement parts were giving us the best performance and service.

“I particularly noted the outstanding endurance of Lipe Rollway Clutches and I thought you would be interested in knowing of our experience.



*There is a Lipe Clutch to meet requirements of vehicles 18,000 lbs. G.V.W. and up; for torque capacities from 200 to 3000 ft. lbs. For application assistance and specific data, contact the Company direct.

“Penn Yan Express, Inc., operates a fleet of 60 heavy duty tractors, hauling maximum pay loads over a five state area with all kinds of highways and weather conditions, traveling in excess of three million miles annually. Lipe clutches have played a tremendously important part in keeping this fleet rolling. Our records indicate Lipe Clutch performance to be in excess of 175,000 to 200,000 miles.”

The experience of this fleet is another illustration of why . . .

the trend is to LIPE!



-ROLLWAY

CORPORATION
SYRACUSE 1, N. Y.

MIEN

IN THE NEWS



Ford Motor Co., Styling Office—Thomas J. Burns has been named administration and planning manager.



Pratt & Whitney Co., Inc. — Gordon W. Smithson has been promoted to chief engineer.



Stewart - Warner Corp., Alemite and Instrument Div. — Gus Treffeisen has been promoted to marketing manager.



White Motor Co., Autocar Div. — Lee J. Perme has been promoted to assistant to the general manager.



Bendix Corp., Bendix Products Div.—Robert J. Dubuc has been named general quality manager, automotive components.



Sealed Power Corp.—Boyd W. Kueck has been named manager of export sales.

Olin Mathieson Chemical Corp., Chemicals Div.—Dr. Herman A. Brunson has been appointed vice president—research.

Chrysler Corp., Plymouth-De Soto-Valiant Div.—John R. Cooper has been promoted to special events manager.

General Electric Co., Aircraft Nuclear Propulsion Dept.—David F. Shaw has been named general manager.

Clevite Corp., Cleveland Graphite Bronze Div.—John J. McKinnie has been named Detroit district sales manager.

Snyder Corp.—Ronald P. Wallace has been appointed controller.

General Motors Corp., Chevrolet Motor Div. — Leonard F. Coyle has been appointed manager of engine, forge and foundry plants in Tonawanda, N. Y.

Jones & Laughlin Steel Corp. — Roger M. Wolcott has been named director of production planning programs.

Clark Equipment Co.—Eugene A. Keen has been appointed assistant comptroller.

Electric Autolite Co. — Elgin C. Brooks has been named production manager of Plants 2 and 15 in Toledo.

Farrell Mfg. Co.—Burton H. Alden has been appointed assistant sales manager.

Curtiss-Wright Corp., Metals Processing Div.—Stanley B. Kurzina, Jr. has been appointed general manager.

Diamond T Motor Truck Co.—Ray Robbins has been promoted to director of quality control and Roy A. Decker has been named head of sales engineering department.

Pittsburgh Plate Glass Co., Glass Div. — Merle M. Eakins has been named general manager and Stephen Jeckovich has been appointed general manager, production services.

General Motors Corp., Chevrolet Motor Div.—Robert W. Podlesak (far left) has been named manager of all manufacturing plants and Edward S. Wellock has been appointed product reliability director.

Allis-Chalmers Mfg. Co., Industrial Equipment Div.—G. A. Saar has been promoted to general manager of mechanical departments.

Drott Tractor Co.—Burton E. Clark has been named general sales manager.

Warner Electric Brake & Clutch Co.—William W. Keefer has been appointed vice president and comptroller.

B. F. Goodrich Tire Co.—Charles H. Kanavel has been named Detroit manager of equipment sales.

Minneapolis - Honeywell Regulator Co.—Dr. Van W. Beringer has been promoted to research director and Dr. John N. Dempsey and Edward E. Rexer have been promoted to assistant research directors.

General Motors Corp., Fisher Body Div.—Eugene I. Danaher has been promoted to manager of Framingham, Mass., plant.

General Dynamics Corp., Convair Div.—Howard H. Hart has been appointed factory manager at Pomona, Calif.

Northrop Corp.—Richard E. Horner has been named vice president in charge of technology.

Allis-Chalmers Mfg. Co., Engine-Material Handling Div. — Louis B. Schultz has been appointed engine product manager.

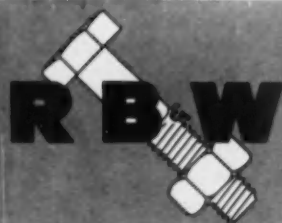
United States Rubber Co.—John D. Heide has been promoted to senior research scientist.

Necrology

Ned T. Wagner, 44, an attorney on the general manager's staff of Chrysler Corp., died July 18 in Traverse City, Mich., while vacationing.

Louis B. Hyde, 66, retired engineer and purchasing agent for American Metal Products Co., died July 22 in Grosse Point Park, Mich.

Ernest E. von Rosen, 88, died July 21 in Detroit. He was secretary and treasurer of the Saxon Motor Co. and assistant secretary and treasurer of the Maxwell Motor Corp.



FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technicalities

By Fred E. Graves

Fastening of gasketed joints

The right fastener for a "flexible" joint rests on type of gasket material and its compressibility. Total preload on all the fasteners in the connection must be enough only to compress the gasket and provide sufficient additional clamping force to withstand the hydrostatic test pressure. More than this brings on a good chance of leakage, through "bowing" of the clamping plate.



Exaggerated sketch showing how too much torque tends to distort clamping plate and leads to leakage.

HYPOTHETICAL CASE

Suppose a joint is tightened with Grade 5 Hex Screws to their yield strength, and leakage develops. By going to alloy screws and tightening still further you would still get leakage. But Grade 2 Hex Screws, all torqued evenly, would no doubt solve it.

ACTUAL CASE

The fasteners on one product's flange had to withstand a 4000 pound hydrostatic pressure. But the hard asbestos gasket used took a bolt load of 28,000 pounds for sufficient compression to seal. By substituting a rubber and fibre gasket in this case, bolt load could be reduced. So could bolt size, thereby saving 73% on fasteners.

Using Hex Screws in tapped holes saves money



In the cast "coupon" shown above, the hex screws were torqued tight and removed 50 times—then torqued to failure. Note in the cutaway that the casting's threads are still perfect with no sign of stripping. It was the screws which broke—a clear demonstration that castings fastened with hex screws will suffer no thread damage during repeated disassemblies.

TWOFOLD BENEFIT

When there are no space clearance problems or other special requirements, using studs of 1-inch diameter or smaller often penalizes the user. First, in direct costs, since the more economical hex head screws will do the job to specification. And second, in production costs, since studs require that tapped holes have an interference thread fit, which in turn results in slow, "selective" assembly to determine properly

mated threads. Hex screws need only a clearance fit, assemble faster.

ACTUAL EXAMPLE

In one of his surveys of fastenings used by one company, the RB&W engineer pointed out that over 250 stud fastenings were being used in a large refrigeration unit. The same number of hex screws, costing \$8.45, saved \$22 over the studs and nuts. Annually, the total would be \$7,800 on the production run of this unit.

Not to be overlooked either was the tangible saving on the less critical tapping job required.

RB&W offers its help on your specific fastener problems, or an overall survey of your fastener usage. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.



The Dimensions of Automotive Demand Point UP for 1961

A LONG ABOUT THIS TIME of the year when vacation schedules are keeping important sources of industrial news at a low ebb, the calamity howlers get in their best licks. Since there is a deficit of important economic news, the pessimists have the best possible opportunity to break into print.

THE BROAD, POPULAR AND IMPORTANT general interest in the future of the automotive industries nevertheless creates a demand for some more reliable estimates of future trends. It should be possible to compile some data which could be used to satisfy this demand. Possibly a first step in this direction could be an analysis of the kinds of information which influence the total future production and sales for vehicles and their components. Such data could be described as the "Dimensions of Demand."

PERHAPS THE FIRST DIMENSION is the number of persons and things which have to be moved by vehicles of all types. Economic statistics show that these numbers are growing substantially each year. The effect of this growth is that more vehicles are needed to move more people and things every year.

PERHAPS THE SECOND DIMENSION is the number of vehicular transportation miles per person or per product. This figure is also in a stage of continuous growth. The radius of action in terms of miles of travel per person or per commodity, is increasing each year. This too creates a demand for more vehicles.

PERHAPS THE THIRD DIMENSION is the economic cost of travel per mile or person, as compared with costs of other means of travel. With railroad rates and aviation fares going up pretty steadily some travel costs are rising much more rapidly than comparable costs of automotive vehicle transportation. Indeed, some automotive travel costs have gone down during the past year due to better engines, better highways and

throughways, better fuel utilization, compact cars and other factors.

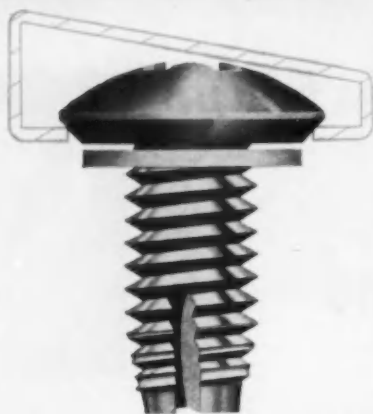
THESE ARE POWERFUL FORCES with built-in dynamics seldom studied or evaluated by lay economic pundits. As a result of using such data, some general observations can be made about the outlook for the industry for 1961.

1. Truck, bus and tractor production will continue strong and maintain recent growth rates or exceed them.
2. Passenger cars will maintain present annual output trends and probably surpass them, with definite increases in exports as well as the domestic market.
3. Demands for industrial engines will continue to maintain present growth rates and probably go beyond them. Marine engine production will have to be increased to make up for set-backs which occurred in 1960.
4. Farm equipment production should increase if new legislation is enacted to reflect a more realistic view of the farmers' needs.
5. Military vehicle production should be sharply increased on a wide range of major new vehicular models now ready to be produced.
6. Parts and components manufacturing should equal or exceed 1960 rates of output generally.
7. Engine powered construction equipment output should exceed 1960 production rates.
8. Aircraft engines should be produced in larger volume than in 1960.

EACH OF THE THREE BASIC NEEDS for vehicular transportation is increasing and so far there has not appeared to be any economical substitute. This conservative estimate, of course, would have to be sharply increased if any major national trends increase the needs in 1961.

H. W. Barclay

Editor and Publisher



how much
did Philco
save per unit
with this Shakeproof
idea?



5c? - 23c? - 57c?*



*ANSWER 57c

Ideas like this are important to you whether you make refrigerators or not. This one is typical of Shakeproof ingenuity in research and development that daily creates new ideas for industry . . . ideas to improve product performance, to speed assembly operations, to lower total costs. It represents the kind of creative engineering characteristic of Shakeproof designers and engineers who are available to visit your plant, to study your assembly methods and problems and to design ingenious new fastenings for your specific application.

The idea that is saving money for Philco is the Shakeproof® Trim Mounting Thread-Cutting Sems designed so that decorative molding strips can be snapped into place over the fastener. This eliminates a previous three-part fastening operation and the related disadvantages of locating and holding the bolt while the nut is applied from the opposite side. Shakeproof's Trim Mounting Sems cuts its own thread and eliminates the need for a sealant, too, as the nylon washer is drawn down tightly to serve as an effective sealer.



**WRITE FOR THIS FREE
BOOKLET**

It gives examples of Shakeproof fastening ideas, how they are being used by leading manufacturers in every industry, and how Shakeproof fastening ideas can work for you.



SHAKEPROOF

**"FASTENING HEADQUARTERS"®
DIVISION OF ILLINOIS TOOL WORKS**

St. Charles Road, Elgin, Illinois
In Canada: Shakeproof/Fastex

Division of Canada Illinois Tools Limited, 67 Scaradale Road, Don Mills, Ontario

LOOK TO SHAKEPROOF - THE LEADER IN FASTENING

Circle 138 on Inquiry Card for more data

Left to right: W. G. Sutter, Purchasing Agent; Charles S. Herschick, Plant Manager; and P. F. Banmiller, Assistant Works Manager; Hunting Park Plant of The Budd Company, confer regularly on plant equipment, materials and supply problems



Eight Keys to Buying at The *Budd* Company HUNTING PARK PLANT

By William G. Sutter, P. A.

THE eight points which are most important in selling to the Hunting Park Plant of The Budd Company may not include every consideration which might be suggested to a prospective or current supplier, but they summarize the major points which will help to establish good buyer-seller relationship.

The annual purchases of this plant (the Hunting Park Plant) amount to more than \$50 million and represent products purchased mainly for substantial automotive body and chassis manufacturing done in this plant. The total purchases of materials, supplies and services for the entire company last year were more than \$150 million. Subsequent articles in this series will discuss the purchasing function at other plants of this company.

Points to Stress in Selling

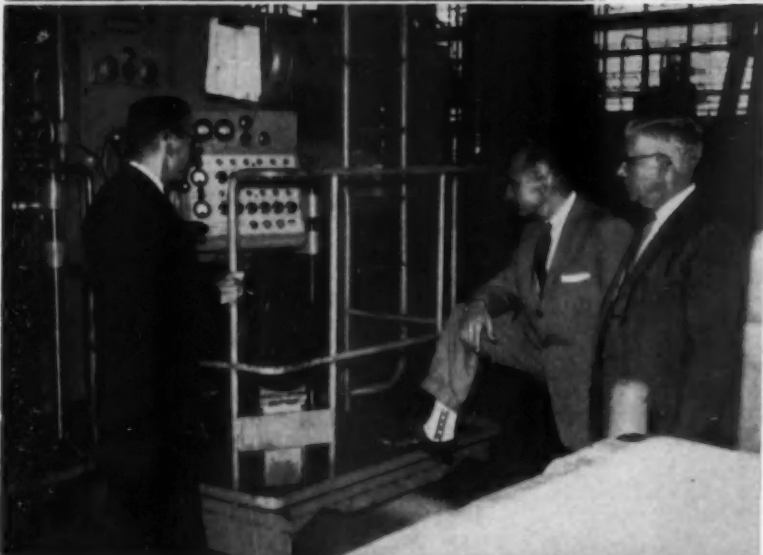
A careful analysis reveals that the points of supplier information cited in an accompanying box may go far to enable any vendor to point up his sales presentation effectively to match the principal points of interest of our purchasing staff at the Hunting Park Plant.

Over the years The Budd Company has had long-standing relations

Purchases of the Hunting Park Plant amount to about \$50 million annually out of a total of more than \$150 million for all plants of the Budd Company



LEFT—Left to right: Mr. Satter, Banmiller and Herschok discuss engineering details of a major new production facilities installation program in the shops, often described as the largest tool and die making facilities in the Western Hemisphere



MIDDLE—Budd executives inspect control console for automation programming of large tool and die making equipment at Hunting Park Plant, largely used for making automotive tools and dies



BOTTOM—The Budd "Buying Team" of purchasing executives and Manufacturing Executives encourage manufacturers' sales engineers to follow up new equipment installations with inspection of new operations when equipment is first used

with many suppliers. Some of these buyer-seller relationships have existed for more than 20 years. However, this does not mean that placing of orders is done as an automatic thing, or that any vendor automatically becomes an exclusive source of supply which bars other competitors from seeking to quote successfully on the particular products which have been involved. The Budd Company does not shut the door of a purchasing department to any potential supplier, and all suppliers are on a competitive basis in conducting their business with the company.

Budd Co. "Buys-to-a-task"

The first essential concept of purchasing at the Hunting Park Plant to be appreciated by a vendor is that we "buy-to-a-task." Each of our kinds of requirements have budget estimates attached so that our "purchasing task" is part of the administration of operations. The successful vendor's offer is the one which is best adapted to the fulfillment of the "task" which has been undertaken by the purchasing department within budget limits. It is our aim to Purchase for Profit.

The financial status of a vendor is important to the purchasing department because the vendor must have at least enough cash on hand, or available, to complete any con-

THE EIGHT VITAL POINTS TO STRESS

The following points may go far to enable any vendor to point up his sales presentation effectively to match the principal points of interest of the purchasing staff at the Hunting Park Plant of The Budd Company

- 1—The products offered by the salesman
- 2—The corporate status of the vendor and his financial and economic strength
- 3—The mechanical and production facilities of the vendor and his production capabilities. Production "follow-through"
- 4—The engineering and technical facilities and capabilities of the vendor and his technical services record
- 5—The vendor's quality control and quality management capabilities
- 6—The vendor's prices and price-quotation methods and record, policies and performance
- 7—The vendor's geographic location and shipping and delivery facilities and record
- 8—The vendor's "Budd Company Consciousness" and real understanding of Budd Company products, production and service

tract which he obtains from the purchasing organization here. This does not mean that a vendor has to be "big business" or is unlikely to qualify if a "small business" status is indicated. Either can be successful in obtaining orders, but The Budd Company purchasing staff must know that the vendor can complete and deliver products ordered on contracts even when his working capital is substantially tied up in production inventories during the life of a contract.

Total Capabilities Important

We have a system in use whereby our Treasury Department checks for us on this aspect of financial capabilities, which is so important on long-term production contracts. This does not mean that a vendor has to have a huge financial rating or history to be successful. It does mean that we have to know that he has the financial capacity available to supply the working capital needed to complete a job or contract.

The mechanical facilities of the vendor are also important. It is unique in some respects that The Budd Company employs specialists who manage the manufacturing of automotive body and chassis products. These men are virtual masters and master-craftsmen in tool-design work, product-design work, production engineering, and manufacturing-methods development. Nevertheless, we are always interested in any way which will help us to work metals faster, better and at lower cost. There is no one final and complete answer to any aspect of metalworking processes, and suppliers who keep us informed of new and unique capabilities, methods, tool and processes have an advantage which has real value in competitive bidding. Budd employs approximately 1000 tool and diemakers, and has under one roof one of the largest die shops in the country.

Quality Control Is Stressed

The "reliability" of a vendor (mechanically, and from the standpoint of materials and process "quality

control") is another important point. Vendors' presentations should provide a clear-cut view of the methods and systems, equipment and techniques which make certain that "reliability" and "quality control" factors are adequate. We like to see a facilities list from a prospective vendor. If a sizeable contract is involved we make a survey of the vendor's plant, using our own industrial engineers, quality-control specialists and purchasing personnel. It is quite an informal kind of a study but it is quite thorough on the points in which we are most interested.

Buys 35,000 Items Annually

Our plant buys about 35,000 items annually and, of these items, about 75 per cent in terms of dollar value is steel or products made of steel. In considering these purchases, low prices are not the single determining factor involved in successful bidding. We are very much concerned with the end-performance of the product. We are interested in putting the vendor's product into our product at the right place and at the right price. It is the ultimate "in-place" cost which is most important to us. If we feel that it is necessary, we will, when a vendor-buyer relationship has been established, arrange to provide production "know-how" to a vendor if he runs into trouble on production of a job for us.

The nature of our services as manufacturers for the automotive industry must be appreciated by our vendors. Because the industry has some urgent peaks and valleys (and has always had them) there may be substantial peaks and valleys in our own delivery schedules, and which must be considered as part of a vendor's requirements. We must know that the vendor recognizes these situations and, while we can be satisfied with one type of a schedule of deliveries at times, there may always be a situation in which we must expect to obtain more than a "normal" rate and volume of delivery. At such times we must have the "ultimate" in services from a supplier. While some-



Each vendor calling at the office of W. G. Sutter, purchasing agent, is given a full opportunity to present all major advantages of the products, equipment and facilities offered for use by The Budd Company

times these are abnormal demands, in terms of shipments, we must know that a vendor is capable of meeting them.

Be "Budd-Conscious"

The idea that a vendor helps himself if he comes to our department showing that he is "Budd-Conscious" is an important factor. For example, he can be much better prepared for his sales call if he knows just what kinds of products are made by The Budd Company. Here at Hunting Park over 85 per cent of our production is devoted to automotive body and

chassis parts. There are approximately 6000 employees here. It should be pointed out, however, that at this plant we also manufacture space-atomic devices and welding controls; whereas, other plants make automotive wheels, hubs, drums, brakes, measuring and testing instruments, railway equipment, plastics, and electronic and nucleonic equipment. Armed with this information, he will have a clearer picture of what products and services might be purchased here from his company.

Being "Budd-Conscious," however, goes beyond the knowledge of what is produced by The Budd Company. A vendor, once he obtains a contract from us, must appreciate the fact that he then becomes a part of the very competitive automotive industry, and should realize that his success depends to a large degree on the proper execution of this contract so that the ultimate in service and quality is accomplished.

The vendor-buyer relationship is one of the most important aspects of company operations, and, because of this, every effort is made to study and understand every potential vendor's capabilities and problems. At Hunting Park our interest in the automotive design, manufacturing, engineering and production aspects of the vendor's capabilities is extremely high. We welcome visitors who think they can provide services and products which will help us to fulfill our purchasing responsibilities. ■

OTAC Breaks Cost Barrier

MILLIONS of dollars have been saved by U. S. military forces and a critical bottleneck in the world-wide flow of ordnance vehicular parts has been ended through the use of an RCA electronic data processing machine.

Army Ordnance officers revealed that in one operation alone, handled by the pioneer Bizmac computer and involving orders from overseas to the Ordnance Tank and Automotive Command in Detroit, more than \$150 million was cut in requests for U. S. aid.

Brig. Gen. J. F. Thorlin, commander of the ordnance center, explained how the taxpayer has been saved millions by modern data processing. Other participants in the parley included Col. David W.

Hiester, command program co-ordinator for OTAC; T. A. Smith, RCA executive vice president for Industrial Electronics Products; and Donald H. Kunsman, vice president and general manager, RCA Electronic Data Processing Div.

Already an antique, although less than four years old, the complicated machine covers most of the third floor of the ordnance center. It ties together nine separate ordnance depots in all sections of the U. S. These, in turn, are linked to world-wide bases. Stored inside the machine is data on 275 types of vehicles, each with more than 1000 parts, their location and each item's level of supply.

The machine handles more than \$300 million in business yearly on

a \$1 billion inventory. The only mistakes, Gen. Thorlin said, have been traced to human error or mechanical problems, such as a key falling off an electric typewriter.

"In 1955," Gen. Thorlin said, "a 55-day period for filling orders was considered to be the Army's on-time standard. Today, the on-time standard has been reduced to 25 days. In addition, 80 per cent of all orders are now filled during that 25-day period, whereas only 60 per cent were filled during the 55-day period in 1955."

The Bizmac system at OTAC was the forerunner of RCA's computer line, now consisting of much smaller machines made possible by the use of transistors.

Since its installation in March, 1957, operation of the system has been supervised by Col. Hiester and Charles S. Diehl, executive assistant in the Data Processing Div. ■

ArmaSteel Crankshafts Cast in Automatic Setup

Crankshafts are lowered into a sonic test chamber and automatically struck with a metal hammer, ringing the crankshaft. The tone is electronically measured with the equipment shown in the background, and the frequency of the sound waves is compared with an established standard.



A RECENT development in the growing rise of cast crankshafts is found at the Central Foundry Division of General Motors Corp. Currently, its Danville, Ill., foundry is producing ArmaSteel crankshafts for Pontiac V-8 engines and for certain versions of the V-6 gasoline truck engines manufactured by the GMC Truck & Coach Division.

Although this foundry was originally set up for making Pontiac crankshafts by shell molding a few years ago, it has abandoned shell molding and is working exclusively with an advanced form of the more conventional green sand molding technique.

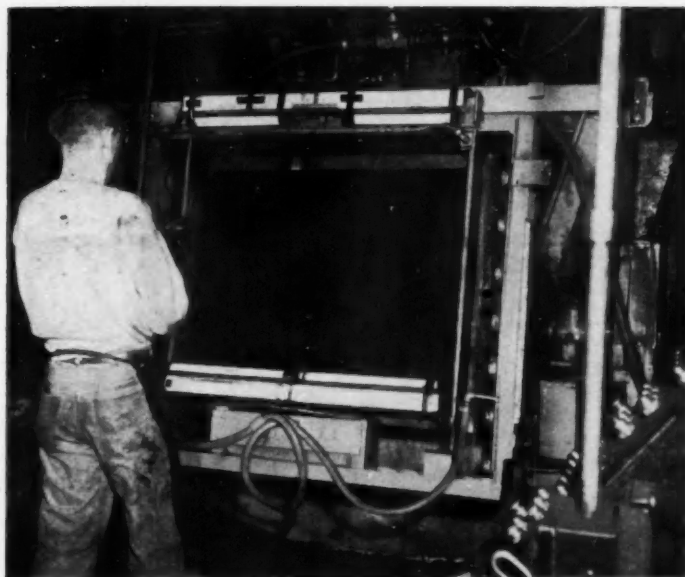
As illustrated here, fully automatic jolt-squeeze-strip molding machines are used to form the drag

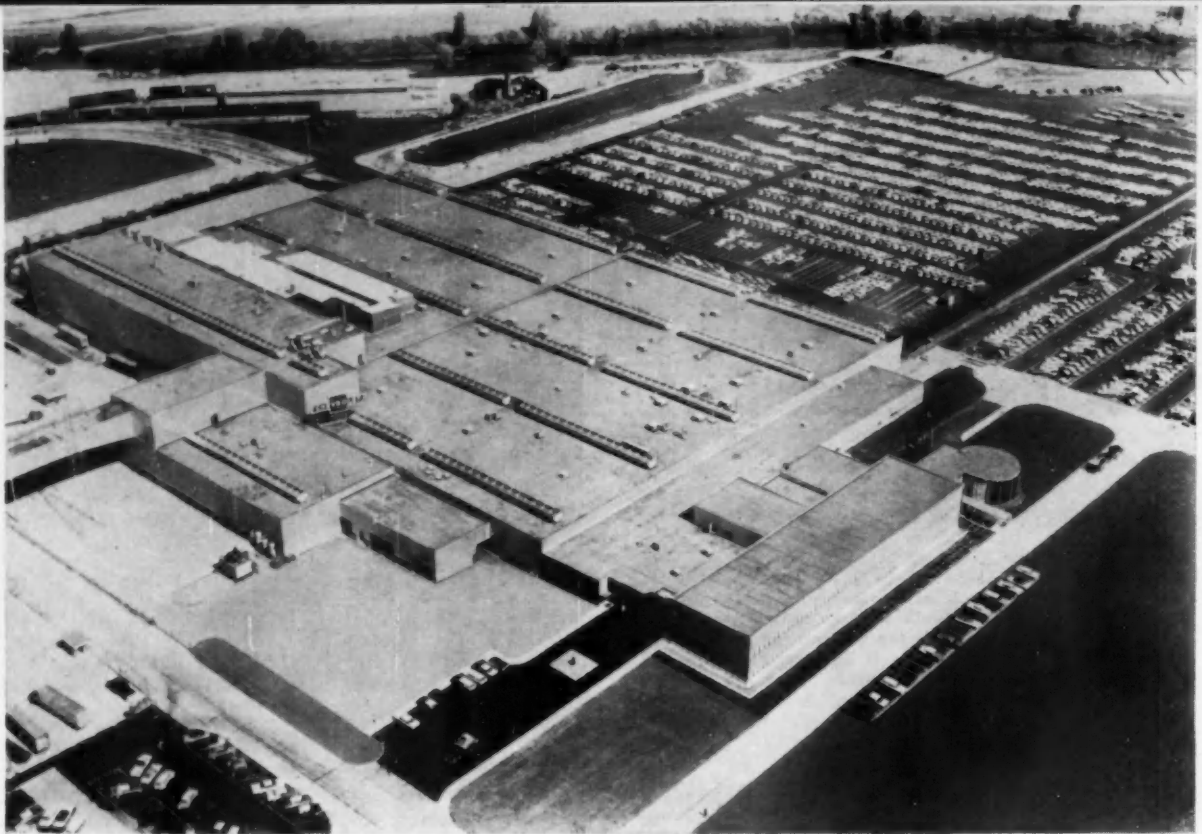
and cope halves of green sand molds for producing cast ArmaSteel crankshafts. About 1200 lb of prepared green sand is used to form a complete mold.

In view of the heavy duty to which crankshafts are subjected, quality controls of exceptional character have been imposed on the finished parts. One of these is
(Turn to page 103, please)

Completely automatic jolt, squeeze and strip molding machines are utilized to form the cope and drag halves of the green sand molds for cast ArmaSteel crankshafts. Each completed cope mold is automatically rolled into an up-

right position to permit visual inspection by the operator. (Illustration below)—Crankshafts are immersed in water and probed internally by ultrasonic beams for possible hidden flaws





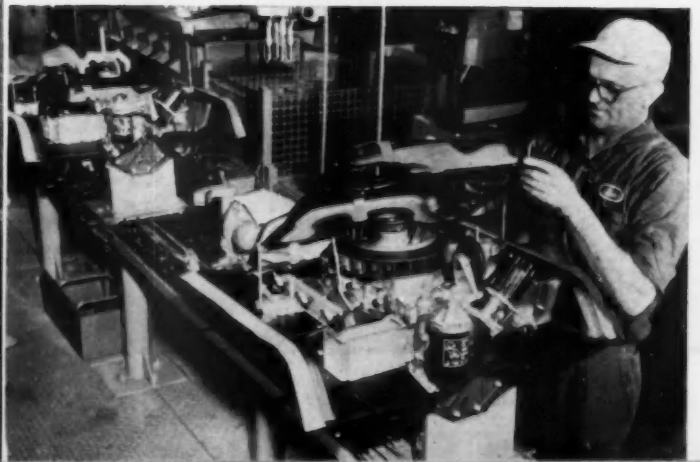
Willow Run Corvair plant; Corvairs are also built in Kansas City and Oakland

Assembling the Corvair at **CHEVROLET'S** Willow Run Plant

Assembly of the Corvair starts with the engine line where workmen attach transmissions

Assembly techniques used in the production of Corvairs at Chevrolet's Willow Run plant differ widely from conventional methods. Such features as the rear-mounted, aircooled engine, and the integral body and frame, make necessary many different procedures.

Fan, air shroud and dust shield are added to the Corvair power train



CORVAIR assembly at Willow Run begins with reception of the body from the adjacent Fisher Body assembly plant and of hundreds of parts and components by rail and truck from other supplier plants.

About a dozen rail boxcars of materials and approximately 60 truckloads of parts are received at Chevrolet-Willow Run each day. Some parts move directly to the final assembly line while others are routed to sub-assembly lines for use in building components, such as the engine-transmission combination.

Mechanical components, such as engines and the transaxle, have been checked throughout their manufacture and test operated prior to delivery to Willow Run. For this reason, receiving inspection is primarily concerned with relationships between mounting holes and hole diameters, shapes of stampings and assemblies, and similar dimensional aspects vital to accurate assembly.

A number of unusual inspections are performed, however. The blower which cools the engine, for example, while similar in function to the cooling fan of a conventional water-cooled vehicle, is subjected to a number of tests to insure quiet and smooth operation. One testing device rotates the blower at speeds up to 10,000 rpm, almost 50 per cent faster than the blower will operate in service, to insure that all welds in the blower assembly are sound.

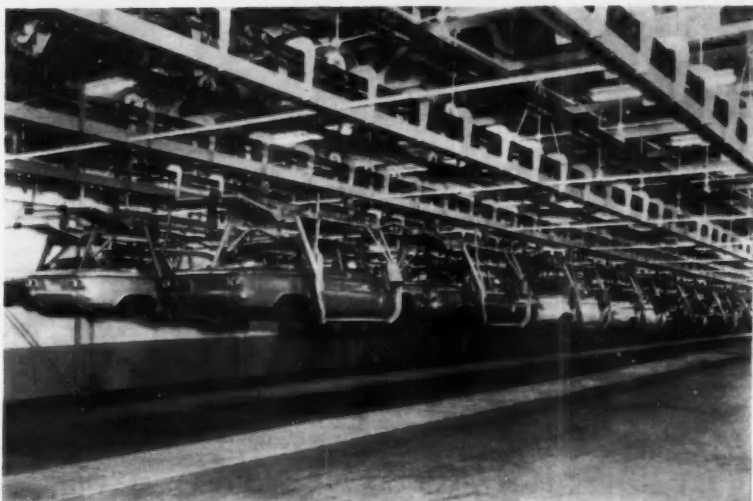
To check the balance of the blower for smoothness and freedom from vibration, a delicate balancing machine is used which can detect a degree of imbalance smaller than a paper clip fastened to the steel blower.

After parts have passed receiving quality control inspection, they are moved to the point along the assembly line where they will be installed on the vehicle; or, in some cases, to sub-assembly lines to form major assemblies installed on the car.

The main assembly line at Chev-



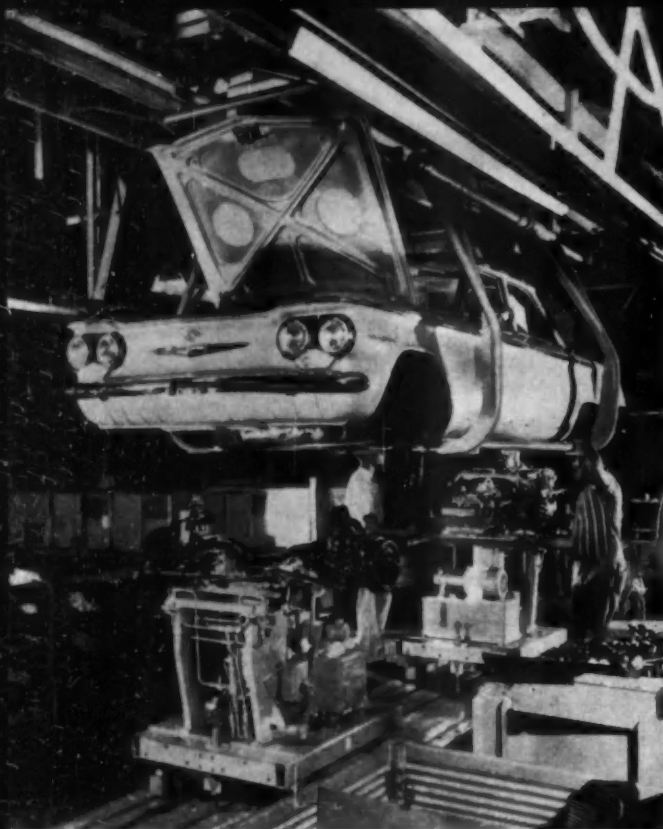
Rear suspension is added to power train assembly and they will be installed as one unit



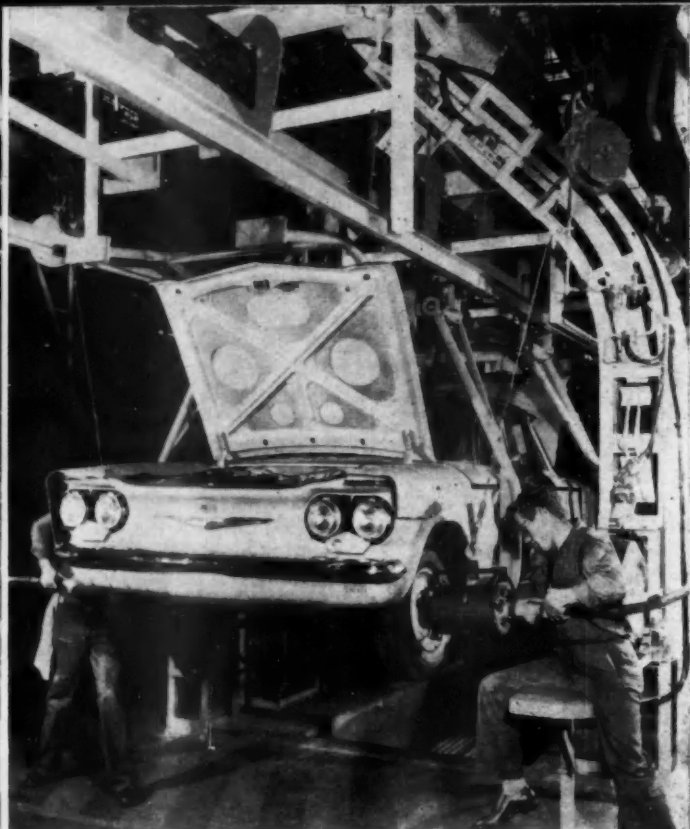
Corvair bodies come from the adjacent Fisher Body plant in cradles which move slowly on monorail system



As bodies slowly move down the line, workmen add cables and controls underneath car



Body hovers over front and rear suspensions (and air-cooled engine); hydraulic lifts bring components up to position where they are attached to body of car



Wheels are added as workmen secure wheel-nuts all at one time with compressed air wrench

rolet-Willow Run is divided into six sections. At the ends of these sections the overhead conveyor which carries the car body lifts it higher as it makes U-type turns to the next work area. The final assembly conveyor line is more than 3500 ft long.

On the first section of the final assembly line the body is fitted

with such parts as the main fuel line, brake lines, steering gear, windshield wiper motor, instrument cluster, and heater. Some of these have been put together on a sub-assembly line which feeds the main, or final, assembly line.

Following inspection, the body is routed to the second section, where such parts as the glove box, brake

and clutch pedals, ash tray and windshield washers are installed.

After further inspection, the body progresses to the third section, where headlamps, back up lights, front and rear bumpers, horn and gas tank are affixed to the car.

Another inspection, and as the
(Turn to page 141, please)



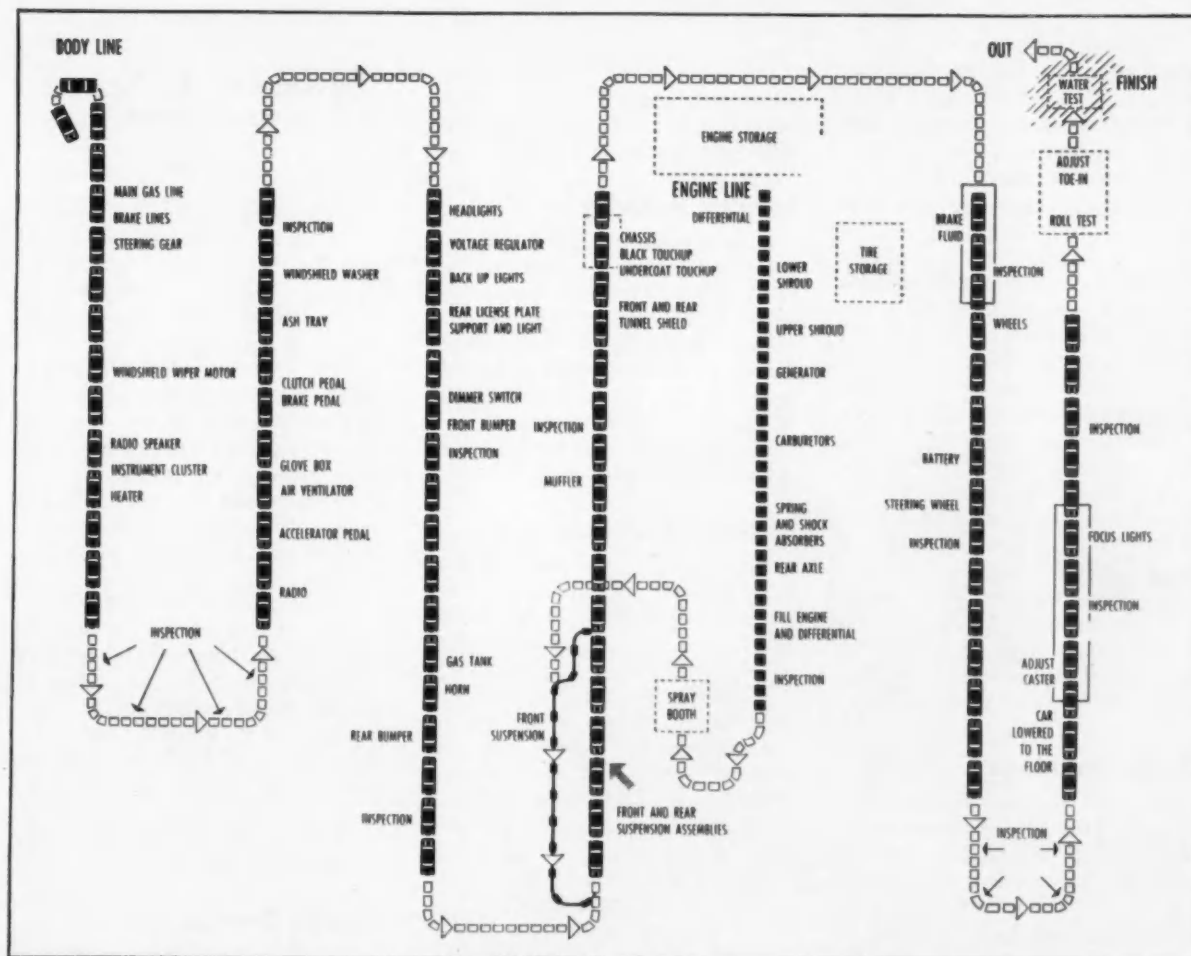
Monorail-cradle dips car down and wheels touch the ground for the first time



Cradle carrying Corvair is automatically released and car moves over workmen in well on moving flat-top conveyor



Spare tire is added in trunk; lights and turn signals tested



Step-by-step flow chart of assembling the Corvair. The Willow Run, Mich., Plant is the only one of Chevrolet's assembly plants devoted exclusively to Corvair assembly.

Brennan "Imp" Powerpackage has an outboard drive with an inboard four-cylinder engine, and weighs around 200 lb. It takes about 28 in. of boat space, and mounting is through transom of boat. Drive kicks up like an outboard when striking a submerged obstacle. Engine has a bore of $2\frac{17}{64}$ in. and stroke of $3\frac{1}{8}$ in., for a total piston displacement of 50 cu. in., and is rated 35 hp max at 5000 rpm.



Marine Engine Manufacturers Report Continued Rise in Sales

IN the marine engine manufacturing field, both order backlogs and inquiry activity are up as compared to a year ago.

Forecasts on the business outlook for the forthcoming year likewise indicate a continued rise in sales.

Design-wise, the engine makers are still working basically in terms of more horsepower in lighter, more-compact packages.

Production facilities have been expanded and manufacturing techniques improved with increasing sales volume.

The foregoing, briefly, is the overall picture given by officials of 14 leading U. S. makers of inboard marine engines and outboard motors. It was derived from recent special reports to AI in response to our semi-annual survey of the industry. Specific details are contained in the following:

Order Backlogs

Increased backlogs, compared to July 1, 1959, were reported by eight companies—ranging from 10 to 90 per cent higher and averaging out at 26 per cent. Five companies reported their volumes of unfilled orders were "about the same." One company did not reply specifically.

Overall, the industry group average works out to an order backlog of +16 per cent—mid-year 1960 versus mid-year 1959.

Inquiry Activity

Nine companies stated their inquiry activity, compared to last year, was up—from 10 per cent to as much as 150 per cent in individual cases. While the average increase of these companies is 47 per cent, the majority fall in the range of +15 to +30 per cent. Three companies said their inquiry activity was the "same."

Business Outlook

Forecasts of order receipts during the next 12 months versus the past 12 months indicate an industry increase of 20 per cent. Most of the anticipated individual-company rises are in the range of from 10 to 30 per cent. One respondent, among three who predicted 30 per cent rises, stated, "This is very significant when last year's 66 per cent increase is taken into consideration."

On the other hand, one company predicted no change; while another company predicted a drop of five per cent. In any case, the average forecast for all companies reporting is a plus of 20 per cent.

By Charles A. Weinert

EASTERN EDITOR

In rounding out the business situation in the marine engine industry, the following statement by Clyde W. Truxell, general manager of the Detroit Diesel Engine Div., G.M.C., is pertinent.

"The Division's sale of marine Diesel engines through May was up approximately 10 per cent over the same period ending May 1959. This increase is significant as the Division earlier this year reported 1959 sales reached the highest level of any year in its peacetime history.

"With inquiries since the introduction of new models in January 1959 also reaching the highest level in the Division's history, a line of marine Diesels designed for practically every inboard use, new manufacturing facilities, and the backlog of orders now on the books, the marine business outlook at Detroit Diesel appears highly favorable for the balance of 1960."

Design Trends

In the survey form, questions were asked as to whether current market demands were influenc-

1959 EXPORTS OF MARINE ENGINES

	Units	Value
Inboard Gasoline.....	2,733	\$1,982,981
Diesel & Semi-Diesel:		
Up to 200 hp.....	1,444	5,164,294
200 to 500 hp.....	502	3,806,819
500 to 1000 hp.....	16	466,939
Over 1000 hp.....	19	1,555,369
Total all Diesel.....	1,981	10,993,421
Outboard Engines.....	50,637	12,103,438
All Engines—Totals.....	55,351	25,079,840

Source: Compiled by National Association of Engine & Boat Mfrs., Inc. from official statistics of the U. S. Department of Commerce.

ing engine designs, engine sizes, and/or accessory equipment, and whether there had been any recent changes in types of materials employed. Typical responses follow:

R. C. Bolling, president, Palmer Engine Co.—“Marine power gets lighter and more compact as it gets more powerful—a continual trend. More aluminum is continually being used. We are starting on a light Diesel program based on I-H Diesels.”

Company Spokesman—“Heavy engine design continues to trend toward more power with less weight.”

Company Spokesman—“Designing toward higher horsepower and higher speed. We have added a full line of turbocharged engines—40 to 260 hp.”

G. L. Bego, director of sales services, Cummins Engine Co., Inc.—“Lower weight and smaller package. Introduced new low profile design for H and NH models. New models are C-160-M, C-175-M, NH-250-M, and NT-380-M. Using more aluminum for weight reduction.”

R. C. White, vice-president-sales, Cerlist Diesel, Inc.—“The principal factor in current market demands relates to adaption of accessory drives for both commercial and pleasure boats—and reduction of overall height for under-deck installations in pleasure craft. Major material change is wide use of 356-T6 aluminum alloy.”

H. R. Nelson, supervisor of direct sales, West Bend Aluminum Co.—“There is a continuing trend toward larger horsepower models and new methods of propulsion.”

Sam C. Spink, director of sales and advertising, Gale Products—“We feel that product design in terms of color is important in outboards. Color matches between the boat and motor play more importance in the customer's mind. We are also getting some reaction from consumers who want to match the color of boat, motor and trailer with their automobiles. Overall size and weight are always important and we keep these two items in mind in product design. Major material change is in use of fiberglass shrouds instead

of aluminum die cast. The main consumer advantage is the corrosion-resistance of fiberglass as opposed to any metal.”

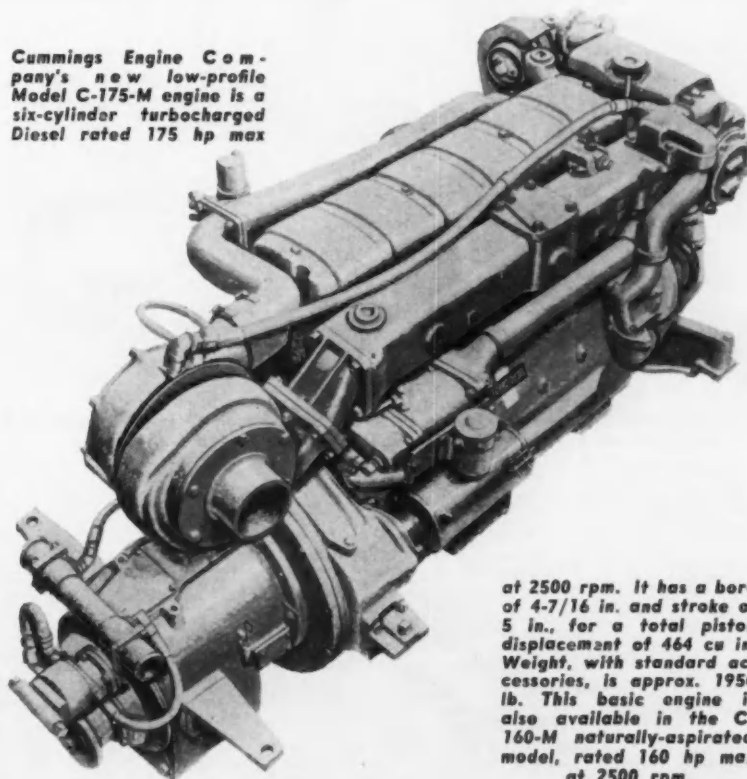
Company Spokesman—“Sizes are increasing and we have increased our coverage on two-stroke turbocharged units.”

E. A. Brennan, president, Brennan Motor Mfg. Co.—“Brennan ‘Imp’ inboard-outboard marine propulsion power package answers requirements for those who desire both inboard and outboard power. We are concentrating on use of aluminum alloy and stainless steel fasteners.”

C. W. Truxell, general manager, Detroit Diesel Engine Div., GMC—“This year the Division further increased the versatility of its line by introducing two new models in the 53 series. A four-cylinder engine of 130 hp with inclined block and head, and a six-cylinder V engine of 195 hp were shown for the first time at the National Motor Boat Show in New York. These engines have figured prominently in the Division's increased marine

(Turn to page 124, please)

Cummins Engine Company's new low-profile Model C-175-M engine is a six-cylinder turbocharged Diesel rated 175 hp max



at 2500 rpm. It has a bore of 4-7/16 in. and stroke of 5 in., for a total piston displacement of 464 cu in. Weight, with standard accessories, is approx. 1950 lb. This basic engine is also available in the C-160-M naturally-aspirated model, rated 160 hp max at 2500 rpm.

LeTourneau-Westinghouse Paces Market with New Equipment and Special Attachments

L-W Utilizes Special Talents of Other Producers In Marketing Variety of Attachments to Increase Equipment Flexibility and Productivity

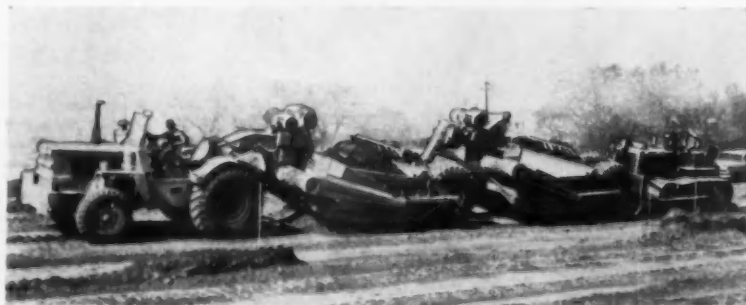
LETOURNEAU-WESTINGHOUSE of Peoria, Ill., is successfully "switch-hitting" against a highly competitive construction equipment market. The company is not only meeting the demand for more power, speed and capacity with new designs, but is extending the productivity and flexibility of L-W equipment by marketing special attachments of other manufacturers.

PRIME MOVER—In a bid to sat-

isfy contractor's requirements for a "hotter" single-engine rig, the company has introduced a new prime mover labeled the "V-Power B Tournapull." Powered by a General Motors two-stroke, 12 cylinder Diesel producing 430 hp at 2100 rpm, and a maximum torque of 1210 lb ft at 1200 rpm, the unit reaches a top speed of almost 32 mph. Coupled with the B Fullpak scraper, the loaded power-to-weight ratio is 320 lb/hp. Struck capacity



New V-Power B Tournapull features 430 hp, V-12 Diesel, 10 speed transmission, 23 cu yd struck capacity, high-inertia steering motor and a top speed of 31.7 mph. (1A Spec Sheet should be placed with above)



of the scraper is 23 cubic yards, with a heaped load of 29 cubic yards.

Teamed with the powerplant is a Fuller L-1550 transmission with a high-low L-W range box. The combination provides 10 forward speeds and 2 reverse and allows the operator to skip shift up or down without double-clutching.

A high-inertia steering motor provides two rates of steer—one for high haul speeds and the other for sharp turns on the fill and in the cut.

Other mechanical improvements include larger final drive gears, a larger radiator, a three section hood and twin Donaldson dry type air cleaners.

TANDEM SCRAPERS—Productivity of the company's prime movers has been increased with the introduction of tandem scrapers. Available behind all three "Tournapulls" as well as the four-wheel "Speedpull," total capacities range from 18 cu yd in the D size to 56 cu yd in the Model B.

Electric controls for the rear scraper transmit power for tailgate, apron and bowl lift through electric cables, eliminating wire rope. A universal-swivel hitch is pivoted over the rear axle of the front scraper, reducing the tandem's overall length and permitting the second scraper to turn a full 90 deg.

Coupling or uncoupling is simplified by quick connect plug-ins for electric cables and air hoses. One hitch pin forms the mechanical connection.

ELEVATING SCRAPER—A self-

L-W's tandem scrapers behind a "Speedpull." Total capacities range from 18 cu yd in the D size to 56 cu yd in the model B.

loading scraper, manufactured by the Hancock Manufacturing Co. of Lubbock, Texas, is being offered as an optional attachment to L-W's "D Tournapull." The slat-type elevator is driven by two L-W electric motors (3600 rpm, 8-tooth pinions) and two gear boxes. A company spokesman reports that on actual tests, the Hancock scraper loaded over 9 pay cubic yards in 75 seconds. Capacity is rated at 10 cu yds.

AUTOMATIC BLADE CONTROL—A new automatic "all transistor" control for maintaining the proper degree of transverse blade slope is now available for installation on the LeTourneau-Westinghouse line of motor graders. Produced by Preco, Inc., The "Dial-A-Slope," sold and serviced by all L-W distributors, electronically maintains the selected blade slope to a reported accuracy of 1/10 of 1 per cent. After selecting the degree of slope and the end of the blade to be automatically controlled (usually the heel), blade slope is automatically maintained regardless of manual adjustments to the toe. With the automatic control, the grader operator can carry his slope all the way across the entire width of the grade from one row of stakes, eliminating intermediate staking.

REAR MOUNTED RIPPER — The American Tractor Equipment Corp. of Oakland, California, is producing a hydraulically operated rear-mounted ripper for exclusive use on L-W's Model 660 and 550 motor graders. Designed to rip asphalt pavement to a 12 in. depth, the unit accommodates up to seven ripping shanks, and is mounted to the grader's rear frame. A hinge action keeps points retracted and out of the way when not in use. A variety of ATECO attachments such as straight or curved shanks, splitter and shank guards, and a scoring disk also are available.

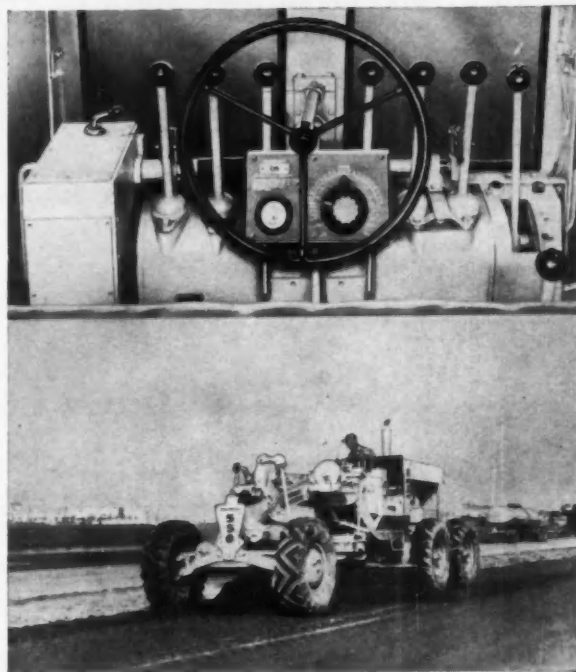
New ATECO ripper for integral mounting on L-W Model 550 and 660 motor graders, rips asphalt up to 12 in. deep.

COAL HANDLING BLADE—A new blade that reportedly handles approximately 50 per cent more material than the conventional dozer blade is being offered as an optional accessory for L-W's Model C

"Tournatractor." The "U" blade measures 15 ft from end bit to end bit and is 4½ ft high. The added size and curvature causes a live rolling action of the coal ahead of the machine decreasing normal handling resistance. ■

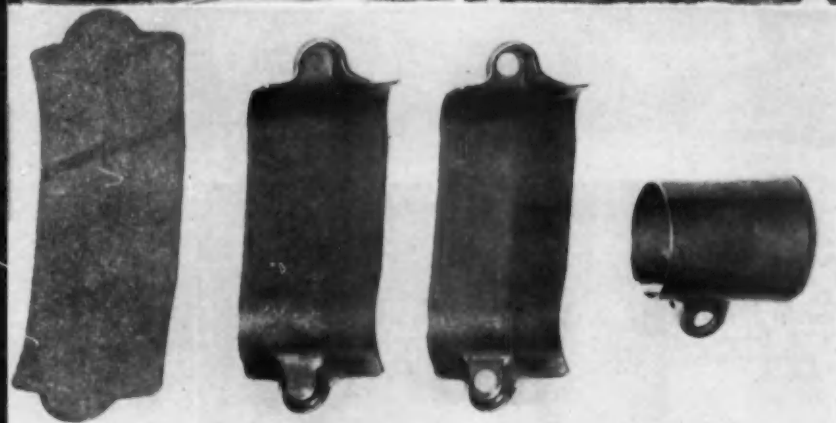
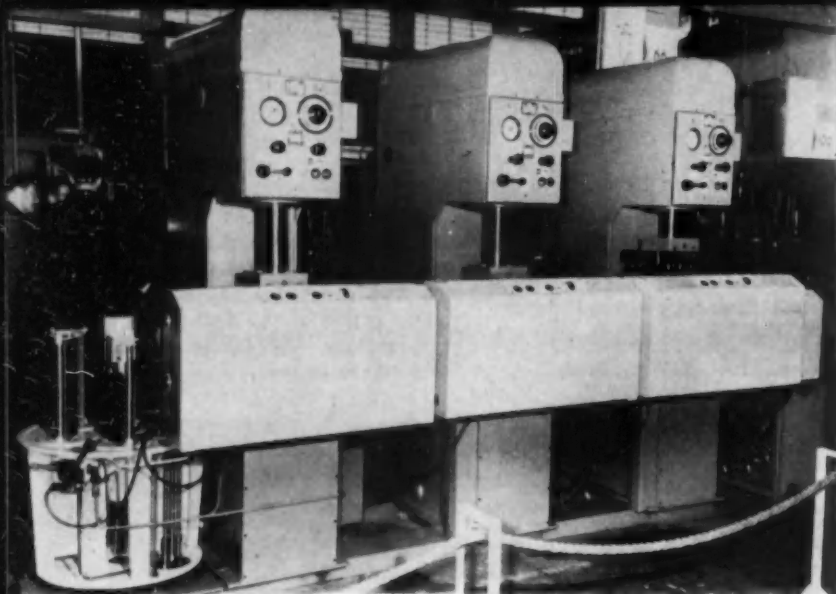


Elevating scraper produced by Hancock Manufacturing Co. as an attachment for L-W's "D Tournapull" series prime movers.



PRECO "Dial-A-Slope" automatic blade control for LeTourneau-Westinghouse motor graders. The unit is available as a factory installed option or can be field installed on any current L-W grader.





East Germans Link Standard Presses for Automatic Line

THE East German machine tool industry is placing increased emphasis on linking up standard machines as a low-cost approach to full automation, and one of the examples is a line comprising three 10-ton presses coupled together by work carriers that shuttle between adjacent unload and load arms serving the individual units.

The flexible layout lends itself to retooling for a variety of automotive components, such as the motorcycle tailpipe clamp.

Pre-cut blanks are stacked in six piles on a rotary table, and picked off singly by a rubber suction cup on the transfer arm loading the first press. Each time a blank is removed a gaging arm on the stationary central column drops over the active stack, and a vertical hydraulic ram beneath it automatically raises the supporting base of that pile to maintain a constant height.

Elevation equaling the thickness of the sheet metal is controlled by the valve linked to the lowered arm

Link-line is formed by standard hydraulic presses whose individual transfer mechanisms are housed in cabinets mounted on the front of each machine. Magazine table at the left stores blanks for the first press, and shuttling carriers convey work between adjacent unload and load arms.

Progressive operations on the pre-cut blank cover stamping the ends and bolt-hole bosses, punching the holes and wrapping into cylindrical shape. Diameter of the motorcycle tailpipe clamp is 1 1/4 in.

which is contacted by the top blank. When the stack is empty the lifting ram retracts and the table indexes to present the next stack.

The identical load and unload arms for the first press traverse together on a common transfer bar whose hydraulic mechanism is self-contained in a housing mounted on the front of the machine. When the load arm is over the pile of blanks it swings down to pick off the top one with its suction cup, while the unload arm simultaneously drops into the lower die of the press to grip the stamping formed on the previous cycle.

Both arms now lift and travel across so that the incoming workpiece is over the empty die and the outgoing one over the shuttling carrier. As the load arm pivots downward to place the blank in the lower die, suction in the rubber cup is broken by the concurrent lifting of the hinged metal tab that normally seals its vent hole. At the same time, the unload arm releases the stamping in a similar way.

After the two arms retract the transfer bar carries them to the mid-position in their travel so that both are clear of the press. The ram then descends for the initial operation, which is forming the ends and bolt-hole bosses. Meanwhile, the outgoing carrier shuttles across to place the previous stamping within reach of the load arm feeding the second press.

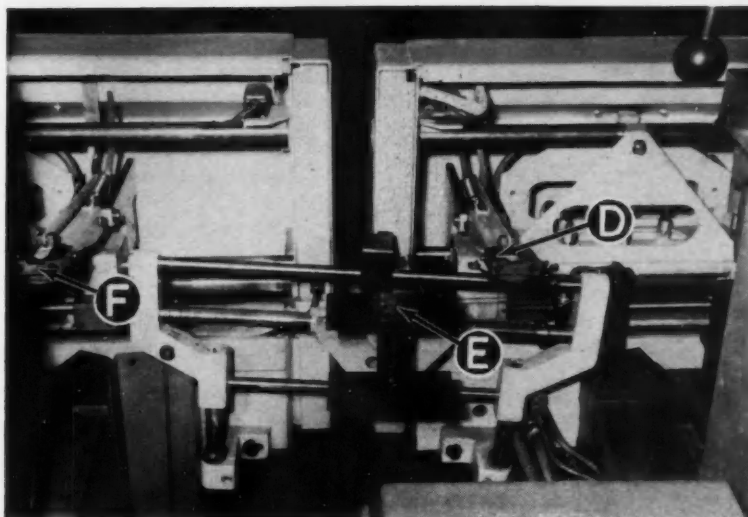
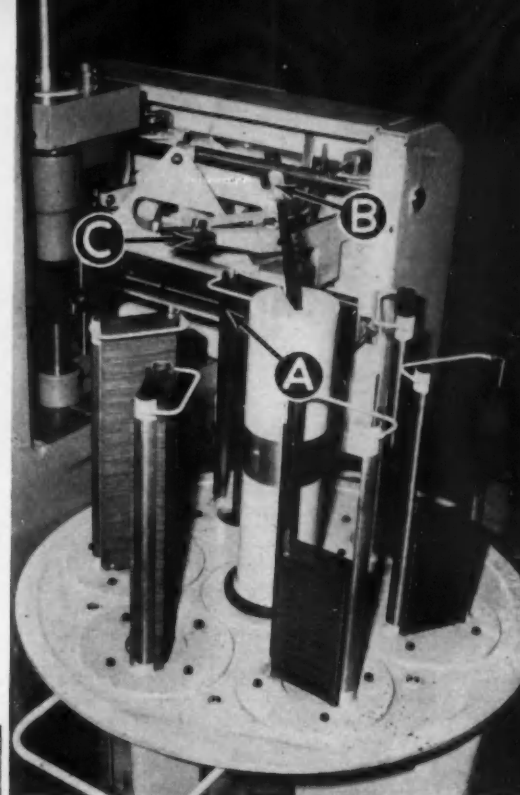
Following the upstroke of the first press the twin arms continue their travel back to the start position, when the cycle repeats. Operation of this independent trans-

fer assembly is controlled by limit switches interlocked with the cycling of its press. Movements of the shuttling carrier are similarly regulated.

Work handling is identical on the second press, which punches out the two bolt holes. Here the load arm picks the stamping off the carrier, travels across to drop it in the lower die, then returns to clear the bed. And, as before, the load arm transfers the outgoing stamping to the second inter-press carrier.

Loading of the third press is again the same, although its tooling is more complex. At this station the stamping is wrapped into

Close-up of the magazine table supplying the first press. The active stack of blanks (A) is raised by a hydraulic ram under the table after gaging arm (B) swings down over the top of the pile to control the height. The arm then retracts and load arm (C) grips the top blank with a suction cup and travels across to drop it in the die.



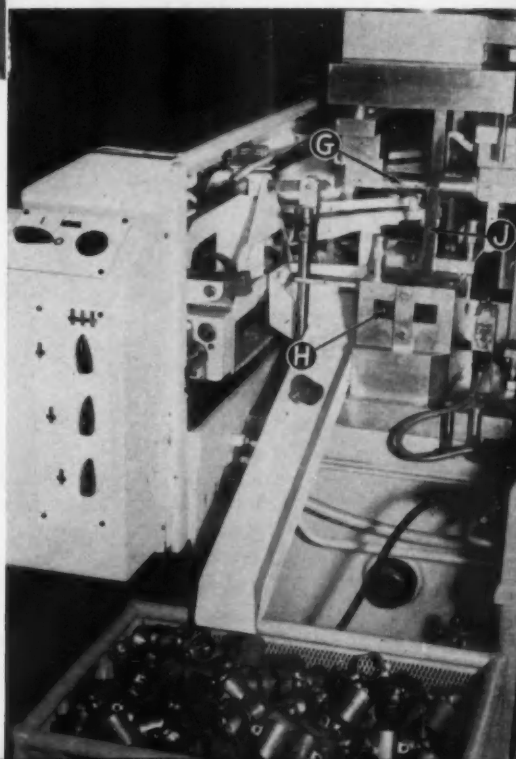
Rear view between the first and second presses, showing unload arm (D) of press No. 1 (right) at the end of its outward travel. Stamping gripped by the suction cup is released when the shuttling carrier (E) is directly beneath it. The carrier then travels to the left, and load arm (F) removes the stamping and transports it to the lower die of press No. 2 (left).

cylindrical form on a horizontal mandrel on the closing die that makes the initial fold during the downward stroke.

As the ram moves down, the shape is completed by horizontal slides on either side of the lower die that are wedged inwards by guides on the descending ram. After the ram retracts the mandrel snaps down at a slight angle, and compressed air blows the finished clamp off the inclined bar onto the exit chute.

This equipment is made by Werkzeugmaschinenfabrik Zeulenroda, a nationalized amalgamation of the former firms of Bell and Vogel.

Stampings are formed to cylindrical shape at the third press. Mandrel (G) on the ram makes the initial fold, and as the stroke continues horizontal slides (H) on the lower die are wedged inwards by guide bars (J) for the wrapping operation. The mandrel then tilts downward and the clamp is ejected by compressed air onto the exit chute.



Silencing Techniques Stressed at Rover Plant

By David Scott

Special European Correspondent
for AUTOMOTIVE INDUSTRIES

Right—Rover 3-Liter is powered by a 115-hp six-cylinder engine. Built on a 110.5-in. wheel-base, it is 186.5 in. long and weighs 3633 lb.

Below—Front sub-frame carrying the power plant and suspension assemblies is joined to the unitized body through six rubber mounting blocks.

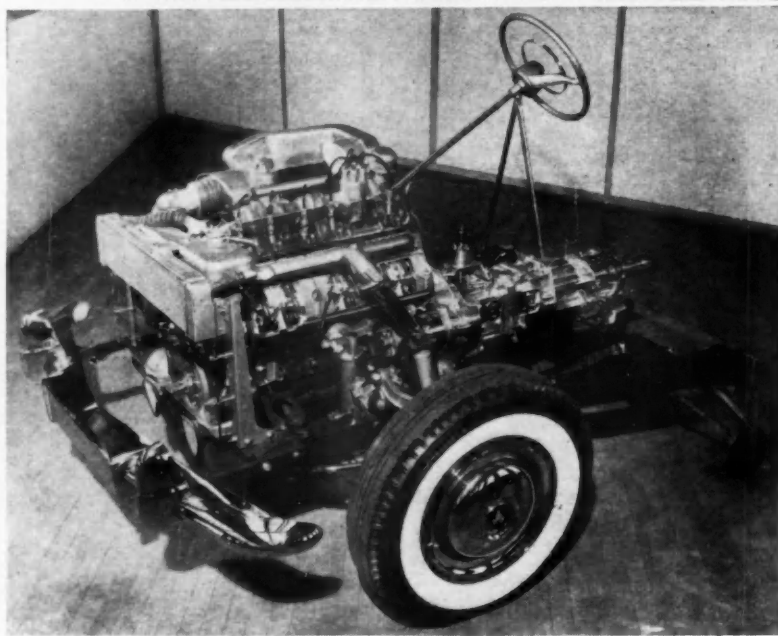


DESIGN problems of the British Rover 3-liter sedan, introduced in October 1958, were complicated by the fact that this was the company's first car to have a unitized body-chassis while it was expected to maintain the same high standard of silence established by earlier and smaller Rover models which are based on a separate chassis frame.

Unitary construction was used primarily to lower the floor and reduce the weight of the new model (it is 3½ in. lower and over 6 in. wider than its predecessors). A compromise was reached by employing a separate sub-frame mounting the engine, transmission and front suspension assembly, and by extensive use of rubber blocks and bushings to eliminate all metal-to-metal contact between the running components and body.

The frame is an all-welded structure formed from two side and three cross box-section members. After arrival at the Solihull plant each prefabricated unit is first checked for alignment on a reception jig. Mounting bosses for the six body attachment blocks are then drilled, spot-faced and tapped on a Brooke multi-head machine.

This consists of four vertical and two horizontal heads, each with two sets of three spindles for

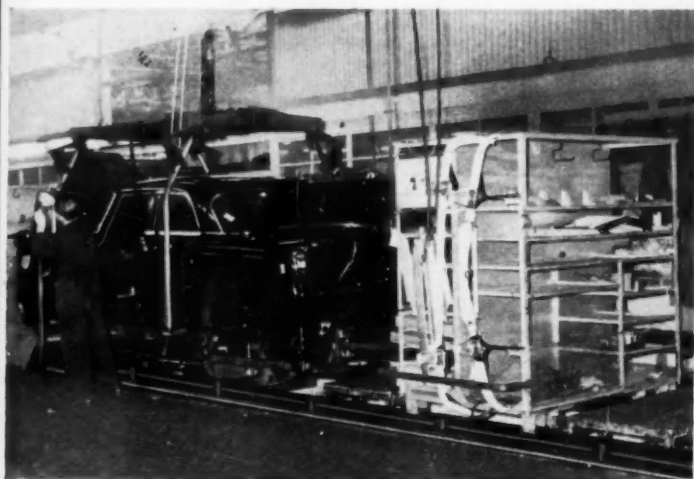


the tri-cornered pads, that cross-traverse between the drill-face and tap operations. Work is precisely located and clamped pneumatically, and simultaneous machining of the six points ensures accurate alignment.

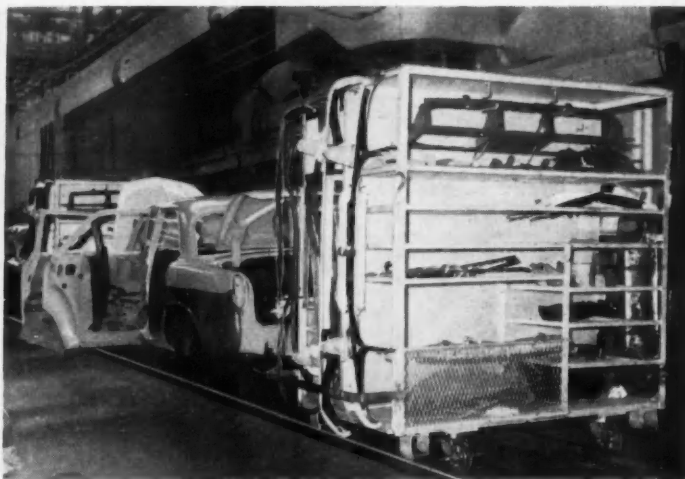
Six identical mounts join the body to the sub-frame (four horizontal ones on the top of the cross

members and two positioned vertically on each trailing end). Supplied by Metalastic, they have a circular core of natural rubber that is bonded internally to the center boss and on top to the cap, while the supporting base ring is embedded in the material.

The engine is supported in front by a pair of Metalastic circular



Body drop on the final assembly line, where the rear springs are hydraulically extended to line up with the rubber shackle attachment point. Trailing carrier holds the grill, bumpers, mufflers and other components.



Start of the body trim line, where bituminous sheeting, double felt underlay and pile carpets are added to bring the total weight of sound-deadening material to 185 lb. Fitted carriers for these and other items, trailing each body, are stocked in an adjacent area.

bobbin-type units angled inwards at 45 degrees. Each 2-in. rubber cylinder is centrally split and bonded to an intermediate metal disk. This interleaved design alters the stiffness ratio for shear and compression to give the optimum flexibility in keeping with torque load requirements. Circular end

plates embodying the fixing bolts on each side give an overall thickness of 1.437 in.

These forward units are positioned and aligned on radii of the engine's natural axis of vibration so that minimum stiffness is at that line. The axis is determined by suspending the power plant and

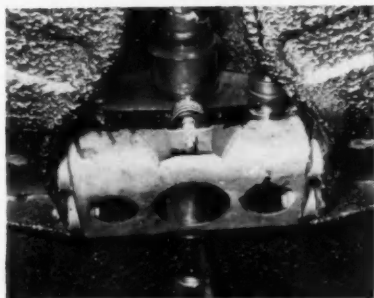
transmission on soft springs and observing the stationary point of the mass during normal running.

Location and design of the rear mounting blocks are less critical, since the vibration axis slopes downwards to pass through the line of the crankshaft. These consist of a simple U-section rubber element bonded to the base and cap. They are placed close together on the second cross member on either side of the transmission tail, and adapters enable the same positions to be used for the standard gearbox, overdrive or automatic transmission.

Conduction of engine noise to the

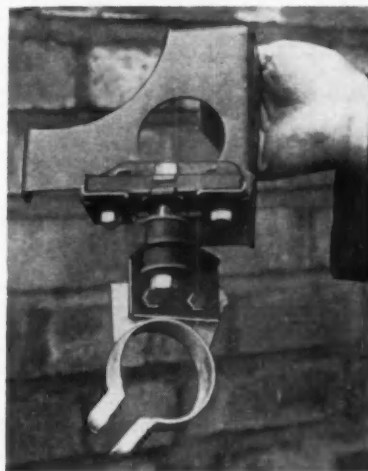


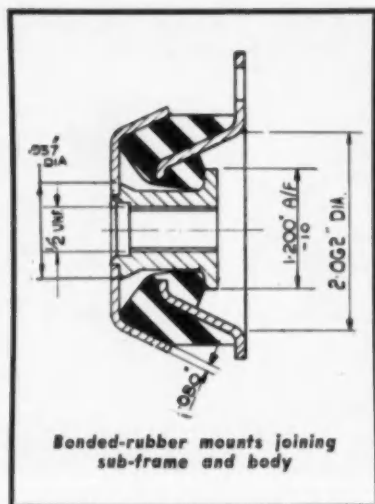
Oil-bath air cleaner is followed by a resonance chamber silencer and a cast alloy duct leading to the carburetor. Heater blower and electric windshield wiper motor are rubber-mounted to the bulkhead.



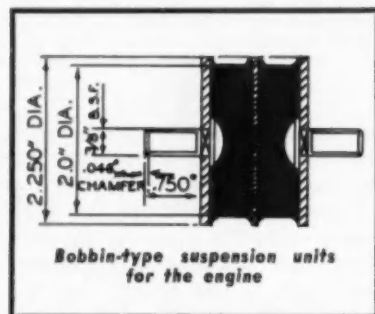
Left—Center bearing of the two-piece propeller shaft is housed in an elliptical carrier cushioned on soft rubber with a coil spring counter-balancing the static weight of the shaft. The main bracket is joined to the floor by rubber.

Right—Exhaust clamp has both rubber grommets and suspension strip to isolate the tailpipe from the body.



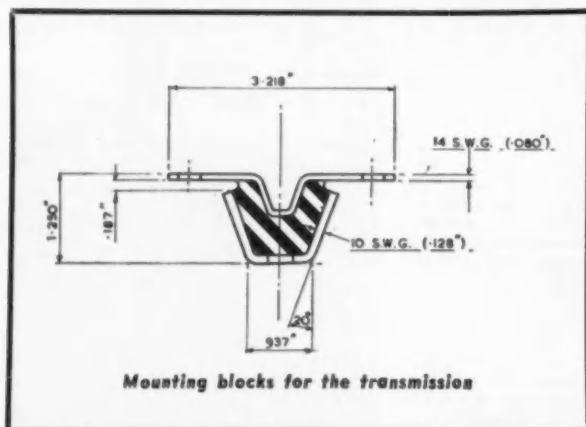


Bonded-rubber mounts joining sub-frame and body

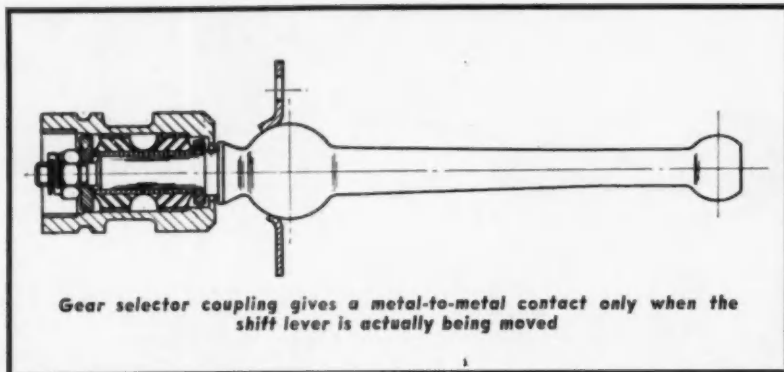


Bobbin-type suspension units for the engine

car interior is further suppressed by rubber-insulating the gear shift lever from the selector turret on the manual transmission. The selector body houses a metal-clad cylindrical rubber bushing whose bore carries the shift lever. Spongy action is avoided, however, by washer-like steel distance pieces on the lever shaft above and below the flexible collar. These clear the selec-



Mounting blocks for the transmission

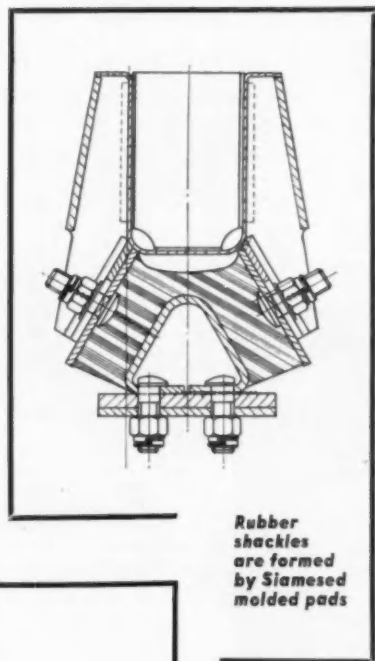


tor body internal diameter by about 0.40 in., so that positive metallic contact is made when the lever is actually moved.

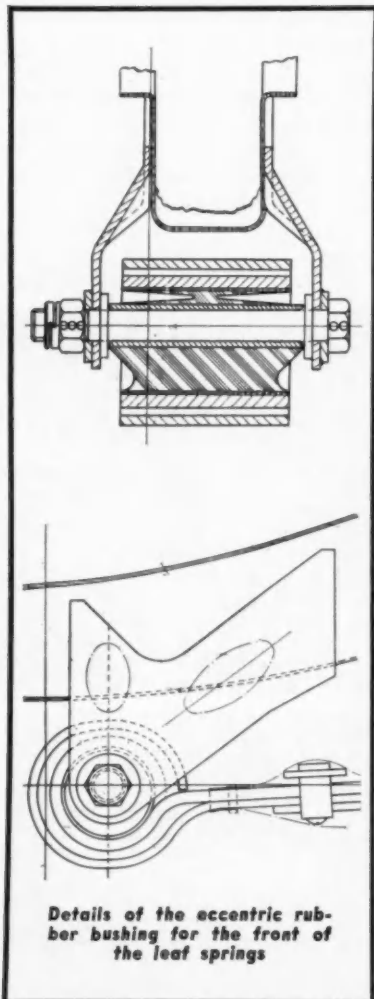
The front suspension with laminated torsion bars is also isolated from the sub-frame. While the ball joint at the bottom end of the

swivel axle is supported in a thrust race to take the weight of the car, the inner ends of the lower link pivot in rubber bushings. Conversely, the inner ends of the upper suspension link have metallic bearings while the outer end carries the

(Turn to page 106, please)



Rubber shackles are formed by Siamesed molded pads



Details of the eccentric rubber bushing for the front of the leaf springs

Close-up within the interior of the induction hardening unit showing the two working stations. Centers for the splined ends are seen at the left, flange chucks at the right. In the foreground are the three sets of roller steady rests as well as the induction coil holder. As the induction coil traverses the length of the shaft from right to left, the steady rests retract to allow free passage.

By Joseph Geschelin

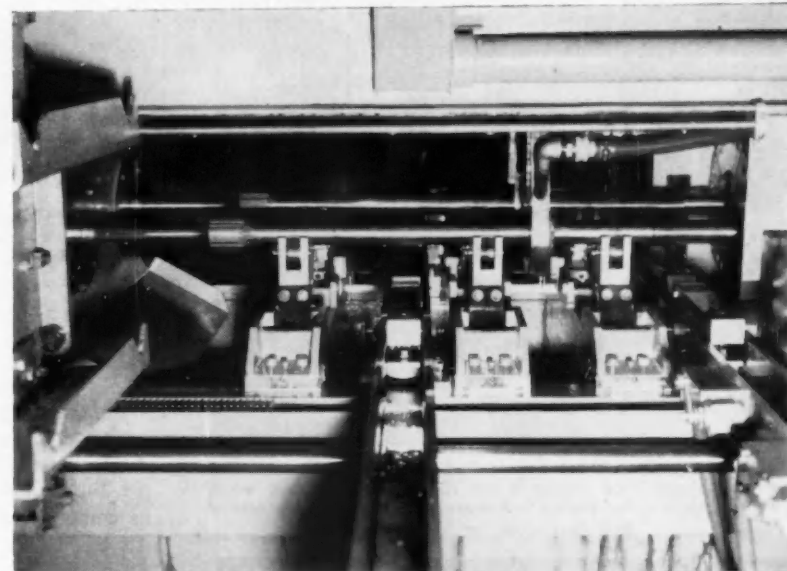
DETROIT EDITOR

STEMMING from a lengthy development program in cooperation with manufacturers of induction heating equipment, the Fort Wayne Works of International Harvester Co. has adopted a special technique for induction hardening axle shafts. The new method, to be described here, makes it possible to use lower priced SAE 1041 plain carbon steel instead of the SAE50B50 furnace-treated alloy, formerly employed, producing axle shafts having longer life, higher impact torsional properties, and free from distortion without straightening.

Moreover, the complete cycle from feed to unload ranges but three to four and one-half minutes depending upon cross section and depth of hardness, two shafts being processed simultaneously.

This development was sparked by the need for rear axle shafts capable of handling the higher loads imposed on motor trucks. In attacking this problem Harvester engineers and metallurgists became convinced that the solution lay either in increasing shaft hardness or increasing its diameter.

It was concluded that the desirable torsional characteristics should be effected by some tech-



Induction Hardening Axle Shafts

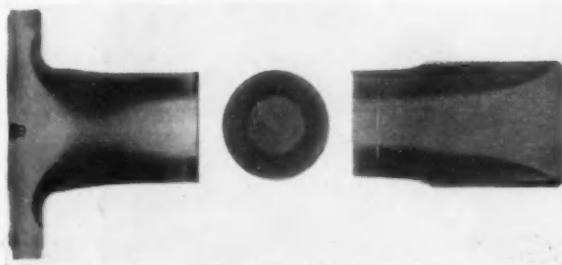
Unique Equipment Eliminates Need for Straightening the Workpiece After Hardening

nique that would produce a very hard, deep case with a soft, tough core making a larger shaft, unnecessary.

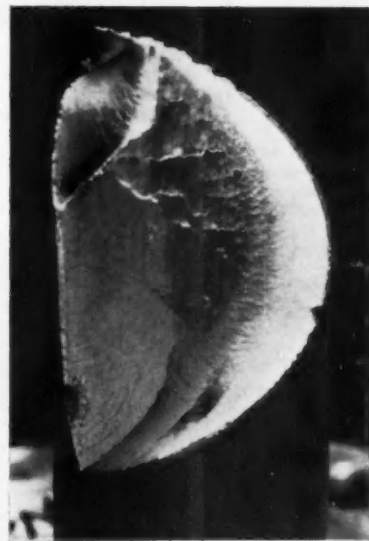
It became obvious that although induction hardening would produce the desired physical properties, it was not a practical solution unless distortion could be reduced to a degree that would eliminate the need for straightening.

At this point the company brought the problem to the attention of leading induction heating equipment producers. Harvester invested funds with two of these

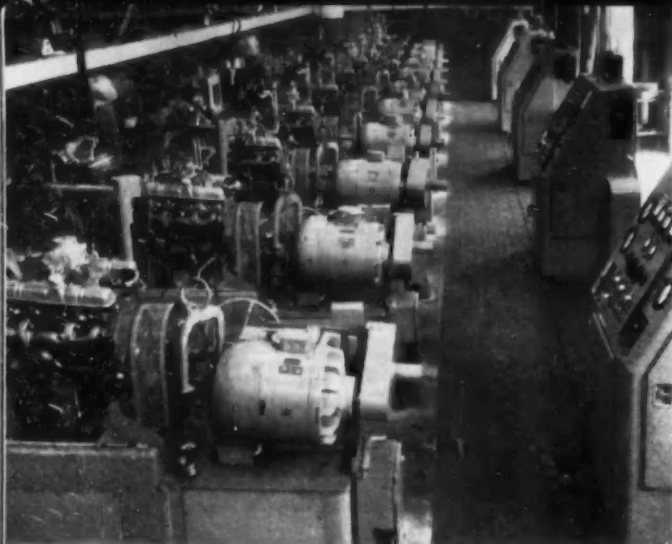
concerns in a joint effort at developing the desired equipment. Following a considerable period of co-
(Turn to page 130, please)



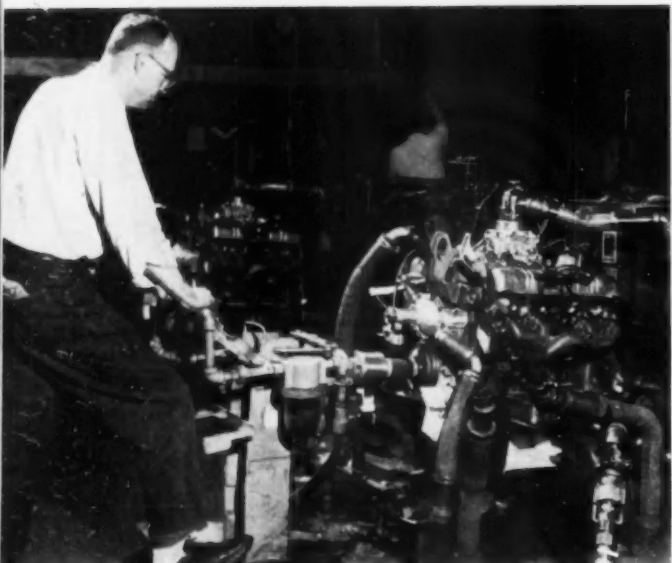
Hardening pattern typical of the Westinghouse equipment is seen in this sectionalized shaft. Depth of hardening is specified at approximately 0.500 in. to meet the specification of average effective hardness of 50 Rc at a minimum penetration of 0.275 in.



Typical clean fracture of induction hardened shaft is shown here. This shaft failed after 40,000 cycles of reversal at 90,000-psi loading.

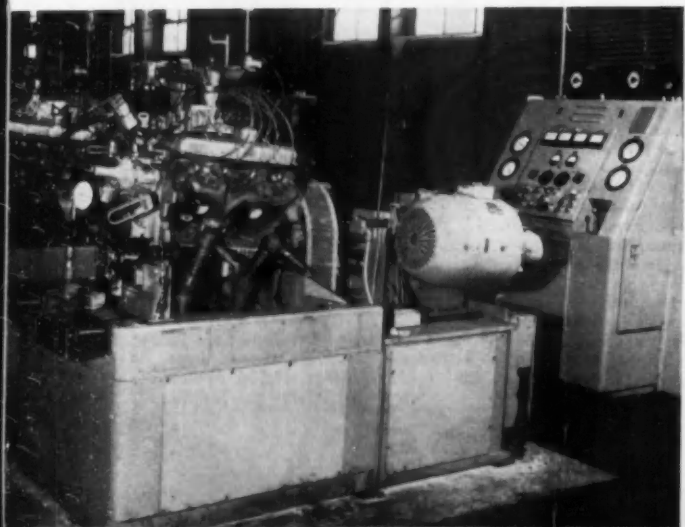


Row of new stands for hot testing of engines in the Buick engine plant. Each engine is run 10 min at 1450 rpm while being checked for timing, oil leaks, etc. and then is tested and corrected for unbalance.



Old test stand in which a portable unit, here shown, was applied to start the engine. Subsequently, each engine had to be shifted to a separate balancing stand, involving extra handling and labor.

Closeup of one new and much more convenient engine test stand on which both run-in checks and balancing are done. Console at right includes balancing instruments, oil pressure and inlet manifold vacuum gages and a tachometer.



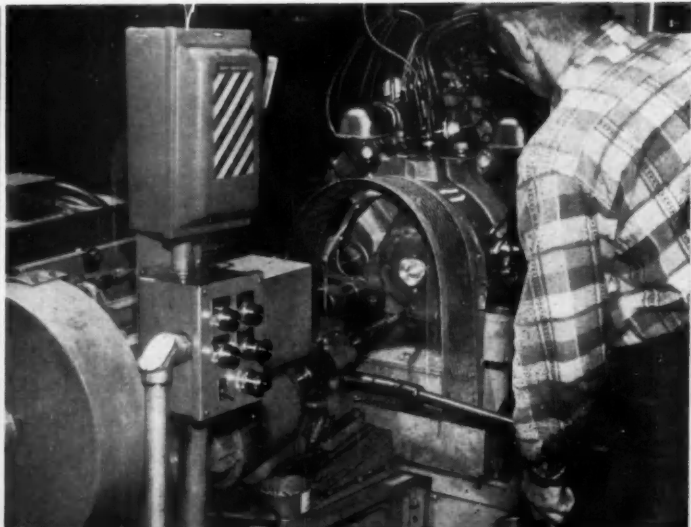
Versatile Test Stands Save Time at Buick

ALL engines for Buick cars are given a hot test and then are balanced and otherwise checked before delivery to the chassis assembly line in the Buick Motor Division, Flint, Mich., or to similar assembly in B O P plants of General Motors Corp. As the test of each engine requires about 16 min, including setup and removal, several rows of test stands are required.

Much of the equipment in the latest of these rows involves marked improvements over earlier lines. Some of the latter continue in use although scheduled for replacement. Among the substantial advantages of the new setups is their ability to test and balance in one location. Formerly, two separate setups were employed and they involved four handlings. Now, only two are needed. This alone saves much time and reduces labor charges.

Formerly, it was necessary to wheel a separate starter unit along the aisles paralleling the rows of test stands, connect its clutch to one end of the crankshaft and press a pedal to start the engine at the beginning of a run. Now, each of the new test stands has its own motor-driven starter that remains in place for use when needed. Before starting the engine, however, water, exhaust and natural gas lines are connected. This is done more quickly than in the older setups. Starting is now done by merely pressing

Using a motor-driven and air-fed drill to produce holes in the triangular steel plate flywheel to reduce unbalance in a Buick engine after other checks are made on the same test stand.



a button and without delay, once piping is connected.

Test requirements call for a 10-min run-in at 1450 rpm before balancing the engine. During this interval, checks are made for noise, ignition, timing, etc., and for any oil leaks. These latter are easily spotted on a polished aluminum pan. It is conveniently located, as the engine has a higher mounting to facilitate this check. Adjustments are made to stop leaks if any are found and to correct any faults in timing or ignition. By this time, the engine is well warmed and ready for balancing.

Balancing is facilitated by instruments on the console. Oil pressure and intake manifold gages and tachometers are designed to serve two test stands. Unbalance has to be held below $\frac{1}{2}$ oz-in. as shown by a Null balance indicator on the console, also serv-

ing two stands. This indicator not only shows the amount of unbalance but the angular position at which drilling must be done on the flywheel to bring unbalance within limits. Front end balance corrections are made by addition of dowel pins in drilled holes of the harmonic balancer.

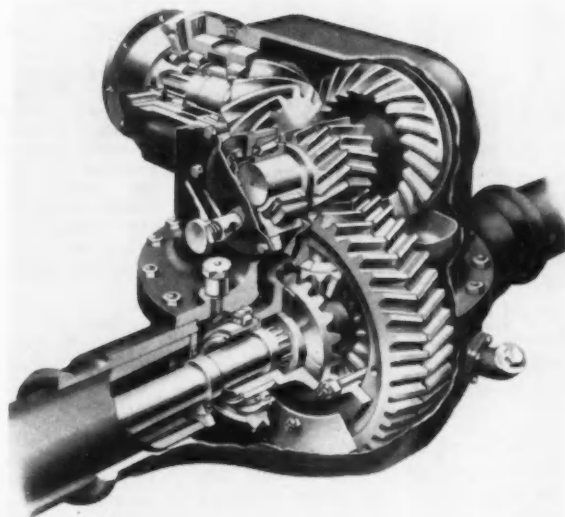
When the necessary readings are made, a motor driven air-fed drill, an integral part of the test setup, is used to produce holes in the flywheel to bring the degree of unbalance below the maximum allowed. After drilling, a check is made to be sure that proper balance has been obtained. This whole setup is faster than that formerly employed and as a result more tests per day and per setup can be made. Power operated trolley hoists aid in rapid handling of engines. ■

NEW Double-Reduction Axle For Heavy Duty Trucks

LEYLAND MOTORS LTD. has introduced a new double-reduction axle designed to withstand the toughest operating conditions likely to be demanded from a single drive axle on heavy-duty trucks. The first hypoid-bevel gear train provides only a slight reduction so that an exceptionally large pinion—normally the weakest component—can be used.

Torque from the hypoid wheel is transmitted through substantial double-helical wheels on a common shaft which effect the second and larger reduction. This gear assembly, exerting no thrust load on the differential bearings, runs in roller bearings required to take only radial loads, thereby increasing the life of the unit.

Positive-flow lubrication throughout the axle insures a continuous supply of lubricant within half a turn of the truck wheels. A connector disk bolted to



Leyland double-reduction axle permits the use of a large 11-tooth hypoid pinion with exceptional load capacity. Wide spiral angle increases tooth contact area.

one side of the large double-helical gear circulates through the bottom of the main housing, and transfers oil to a scoop that feeds it to one of the bearings carrying the hypoid wheel and helical pinion.

A smaller disk mounted on the hypoid wheel conveys oil from a trough bolted on the inside of the differential carrier to the other shaft bearing as well as to the hypoid pinion bearings. ■

ACCOUNTING: ADMINISTRATIVE/FINANCIAL, by George R. Husband, published by Chilton Co., 56th and Chestnut Sts., Philadelphia 39, Pa. Price, \$7.50. Designed for an accelerated accounting course, this book presents a philosophical treatment of accounting and its underlying concepts. Analytical processes, special problems such as depreciation, inventory, valuation, intangibles, the influence of

BOOKS...

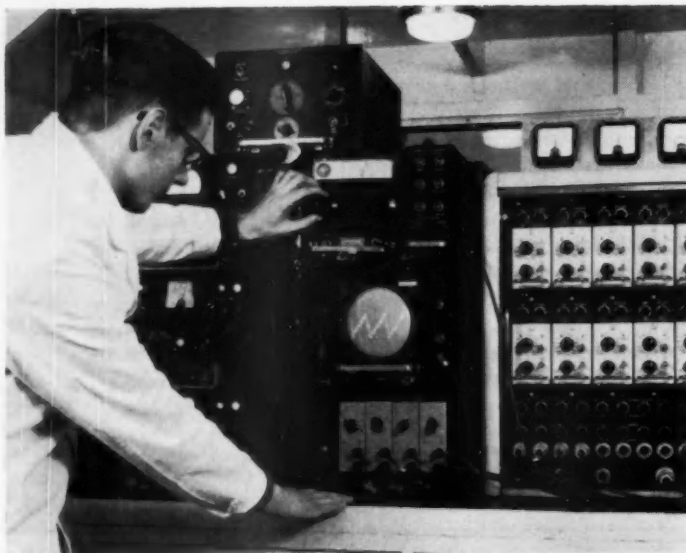
changing dollar values, cost accounting, budgets, and budgetary controls are given substantial coverage.

METALWORKING'S MECHANICAL PRESS HANDBOOK, published by Metalworking Magazine, 221 Columbus Ave., Boston, Mass. Price, \$5.00. Mechanical press design and use, from basic components to complete operating units, are covered in 256 pages. Two chapters of this new book are centered on transfer and high-productivity presses, and include data on loading and slide design, as well as on automatic feeding devices.

New Performance Testing Method for Motor Vehicles

By J. Grindrod

Special European Correspondent
for AUTOMOTIVE INDUSTRIES



A NEW car testing method has been developed in the electronic research department of Sir W. G. Armstrong Whitworth Aircraft Ltd., Coventry, England. The system has been successfully installed in a test car at the request of a leading motor company which is interested in its possibilities. Results are said to have confirmed all expectations.

Briefly, the system enables measurements of various physical factors (strain, pressure, position, vibration, temperature, etc.) to be taken from up to 23 different sources on the car while it is in motion. Measurements are transmitted back to a static receiving station where they are processed and can be presented as graphs or figures to give a continuous picture of performance.

Strain gages, force transducers, thermocouples and other measuring devices can be fitted to almost any part of the car and nearly a quarter of a million readings a minute can be taken from them.

Readings are transmitted on an ultra-high frequency, interference-free wavelength. The prototype system on the car operates on a very low power output and its signals are received clearly in the laboratory two miles away.

When received, the signals are de-multiplexed (sorted-out) and the weaker ones amplified. They can then be processed to show results (in the case of the test car) as a

The receiving end of Armstrong Whitworth Aircraft Limited's vehicle telemetry system. In addition to permanently recording the results radioed from the moving test car, meters and an oscilloscope display give an "on the spot" check enabling the driver to be warned if a part nears breaking point.

The only equipment needed inside a car to test it with the Armstrong Whitworth Aircraft Limited vehicle telemetry system is this box. The illustration shows transmitting equipment through which readings from up to 23 different points on the car are relayed to a ground station while the car is in motion.



variable on a chart or converted and passed through a computer to give tables of figures.

This new method of testing is a great step forward from existing methods which involve carrying either bulky recording equipment in the test car, giving an unwanted weight penalty, or carrying a technician to record readings from meters, with the consequent limitation on the number of readings a human can record accurately, particularly in a bumping, swaying vehicle. Much of the equipment used in the system is in full production for Armstrong Whitworth Equipment.

With the Armstrong Whitworth

telemetry system only the driver need be in the car, and all the equipment required consists of two little boxes which fit on the seat beside him.

No matter how or where the car is driven the readings still will come through from the equipment hundreds of times a second.

Not only are the results automatically recorded for a permanent record but an associated meter display can give an "at a glance" picture of what is happening at any particular instant.

The driver is in VHF radio contact with the receiving station so that the design technicians can tell

(Turn to page 140, please)



Stainless steel

lifts things above the ordinary! Stainless steel reflects gleaming beauty—solid beauty! It won't peel . . . and it resists heat, dents, scratches and corrosion. In fact, no other commercially available metal endures like stainless. No wonder designers and consumers all like it! And remember: The *best* stainless steels are made with Vancoram Ferroalloys! Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh



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Producers of alloys, metals and chemicals



• • INDUSTRY STATISTICS • •

By Marcus Ainsworth
STATISTICAL EDITOR

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Vehicle Make	Weeks Ending		Year to Date	
	July 30	July 23	1960	1959
PASSENGER CAR PRODUCTION				
Total—American Motors Corp.	9,718	9,494	319,087	259,541
Chrysler		1,616	53,817	50,277
De Soto		227	16,377	33,969
Dodge		7,595	265,272	108,950
Imperial			8,663	11,919
Plymouth		1,614	156,512	306,245
Valiant		1,938	167,818	
Total—Chrysler Corp.		12,990	668,459	511,390
Comet	5,740	4,785	99,210	25,270*
Falcon	12,441	24,212	292,348	
Ford	16,953	7,301	610,353	972,411
Lincoln	313	295	11,904	17,747
Mercury	1,194	808	96,905	95,060
Total—Ford Motor Co.	36,641	20,615	1,100,720	1,110,486
Buick	4,158	5,462	162,627	158,426
Cadillac	3,389	3,423	104,217	103,568
Chevrolet	30,394	34,548	1,096,820	1,047,190
Corvair	4,938	4,875	163,538	2,656
Oldsmobile	8,263	7,598	242,811	264,144
Pontiac	9,775	10,240	295,266	289,229
Total—General Motors Corp.	60,937	66,146	2,085,281	1,865,213
Total—Studebaker-Packard Corp.		3,062	70,305	98,051
Checker Cab	89	97	4,391	2,839
Total—Passenger Cars	107,385	112,404	4,248,243	3,847,492
TRUCK AND BUS PRODUCTION				
Chevrolet	6,927	7,101	265,485	250,491
G. M. C.	2,551	2,233	69,672	57,104
Diamond T	54	65	1,805	3,793
Diveco	80	100	2,472	2,132
Dodge and Fargo	364	190	46,086	46,453
Ford	7,720	5,537	221,838	208,771
F. W. D.	9	20	616	
International	2,854	2,598	80,763	91,491
Mack	347	347	9,173	10,315
Studebaker		193	9,123	8,280
White	117	309	10,872	11,557
Willys	1,010	2,146	84,988	72,074
Other Trucks	95	95	2,595	2,242
Total—Trucks	21,830	20,692	805,485	768,329
Buses	95	100	2,460	1,848
Total—Motor Vehicles	129,410	133,396	5,056,191	4,617,469

* Edsel production.

1960 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	Five Months		
	May	1960	1959
Vans			
Insulated and refrigerated	500	2,845	1,779
Steel	104	488	286
Aluminum	396	2,357	1,493
Furniture	343	1,147	527
Steel	315	1,029	424
Aluminum	28	118	103
All other closed-top	2,035	12,933	8,553
Steel	392	2,875	2,570
Aluminum	1,643	10,058	5,983
Open-top	258	1,454	861
Steel	87	427	376
Aluminum	171	1,027	485
Total—Vans	3,136	18,379	11,720
Tanks			
Non- and low-pressure			
Petroleum and aircraft refuelers			
Carbon and alloy steel	153	752	863
Stainless steel	22	113	88
Aluminum	126	878	528
Total—Petroleum	301	1,743	1,479
Chemical, food, and sanitary	75	329	153
Dry materials	149	683	510
High-pressure (LPG, chemicals, etc.)	28	132	130
Total—Tanks	553	2,887	2,272
Pole, pipe, and logging			
Single axle	20	98	104
Tandem axle	86	434	335
Total	106	532	439
Platforms			
Racks, livestock, and stake	25	110	159
Grain bodies	86	692	573
Flats, all types	802	4,661	3,407
Total—Platforms	923	5,403	4,139
Low-bed heavy haulers			
Dump trailers	204	990	880
All other trailers	153	686	799
Total—Complete Trailers	339	1,695	951
Total—Complete Trailers	5,414	30,572	21,200
Dump trailer chassis ¹	146	493	
Trailer chassis only ¹	162	1,529	1,598
Total—Trailers and Chassis	5,722	32,590	22,798
Detachable van bodies ¹	310	1,361	848

¹ Sold separately.

NEW PASSENGER CAR REGISTRATIONS BY REGIONS

Zone	Region				Five Months		Per Cent Change		
		May 1960	April 1960	May 1959	1960	1959	May over April	May over May 1959	Five Months 1960 over 1959
1	New England	40,990	40,413	34,832	156,901	129,980	+ 1.43	+17.68	+24.54
2	Middle Atlantic	132,907	127,343	100,994	538,803	443,276	+ 4.37	+31.60	+21.55
3	South Atlantic	88,304	86,051	78,042	362,977	331,160	+ 2.62	+16.13	+15.65
4	East North Central	162,467	163,816	158,716	714,184	638,826	- .81	+ 2.38	+11.80
5	East South Central	26,709	26,137	24,688	132,311	114,020	+ 2.03	+16.43	+16.04
6	West North Central	53,472	54,337	55,349	231,171	231,595	- 1.59	- 3.39	- .18
7	West South Central	52,023	46,524	48,929	226,358	209,820	+11.82	+13.27	+ 7.88
8	Mountain	21,086	23,194	20,087	95,181	89,969	- 9.05	+ 5.02	+ 5.79
9	Pacific	67,067	77,472	66,882	337,419	317,232	-13.43	+ .32	+ 6.36
Total—United States		647,055	647,287	583,459	2,815,305	2,501,878	- .04	+10.90	+12.53

* Compiled from official state records. Data property of R. L. Polk & Co. May not be copied, sold or reprinted without Polk permission.

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida. Mont., Nev., N. M., Utah, Wyo. Zone 9—Alas., Cal., H. I., Ore., Wash.

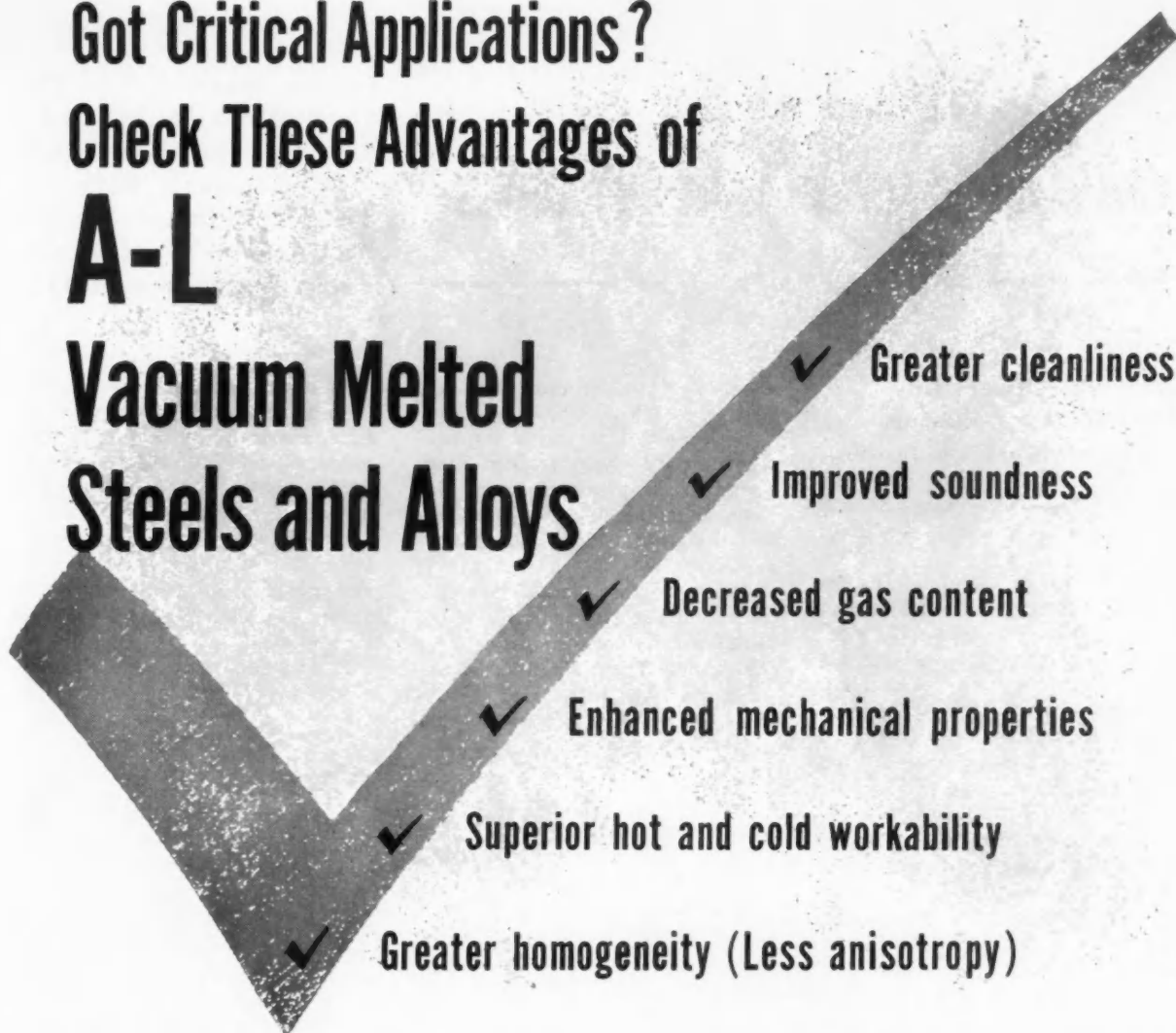
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1960 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

	Period	6,000 lb. and less	6,001-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	33,000 lb. and over	Total
First Quarter		205,999	56,758	3,747	9,305	55,290	20,834	10,805	10,037	372,375
April		61,711	18,583	1,019	3,326	15,457	6,847	4,011	3,636	114,590
May		66,382	17,411	1,016	2,850	16,675	6,788	3,466	3,456	118,023
June		61,638	16,823	1,017	3,755	15,866	6,899	3,210	3,192	111,420
Second Quarter		189,711	51,817	3,052	9,931	48,018	20,534	10,687	10,263	344,033
Total—6 Mos. 1960		395,310	108,575	6,799	19,236	103,308	41,368	21,492	20,320	716,408
Total—6 Mos. 1959		330,647	105,682	6,491	57,659	78,809	33,956	21,871	21,306	658,821

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Three different vacuum melting processes are used at A-L to provide you with the exact properties you need at the lowest possible cost. For more information on A-L's vacuum melting processes and their advantages, write for your copy of the new booklet, "Modern Melting at Allegheny Ludlum." It contains technical data on new melting techniques and the quality improvement in alloys. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. AI-8.*

ALLEGHENY LUDLUM

PIONEERING on the Horizons of Steel



News of the MACHINERY INDUSTRIES

By Charles A. Weinert

June M-T Orders Up, Foreign Large Factor

Machine tool orders in June rose, overall, from the April and May rate to the extent of about \$4 million. This rise largely came from foreign business.

In the case of the metal-cutting-machine sector, domestic orders were at the low point of the year, while foreign orders were at the high point of the year. Conversely, the situation on forming-type machines displayed more domestic orders and less foreign orders.

Preliminary figures for the month of June indicate that net new orders for cutting machines totaled \$43.2 million, comprised of \$25.4 million domestic and \$17.8 million foreign. The metal-forming-machine total was \$11.8 million, of which \$9.85 million represented domestic and \$1.95 million foreign orders.

Combined, the cutting-machine order segment of \$43.2 million plus the forming-machine segment of \$11.8 million totaled \$55 million. In this latter amount \$19.75 million, or 36 per cent, of June's net new orders came from foreign sources. For comparison, net new orders in May have been finalized at \$49.95 million. Additional details of the 1960 monthly record are contained in the accompanying table. In June 1959 the net new order total was \$65.4 million.

For the first half of this year, net new orders for both types of machine tools total \$335.8 million. During the first six months of 1959 the equivalent total was \$305.3 million. Therefore the overall rise is 10 per cent. In 1960, cutting-machine orders at \$257.45 million show a gain of about 9 per cent over last year. Forming-machine orders at \$78.35 million show an

increase of 15 per cent over last year's first six months.

With respect to the order performance this year, Ludlow King, executive vice-president of the National Machine Tool Builders' Association, has commented in part as follows:

"Domestic net new orders for metal cutting type machine tools have been slowly decreasing since March, but The Machine Tool Exposition—1960, to be held in Chicago Sept. 6-16, is expected to have a decided favorable impact during the last quarter of 1960.

"Foreign net new orders of metal cutting and metal forming types during the first six months of 1960 amounted to \$88.7 million, or 26 per cent of total net new orders. Various explanations are advanced for this upsurge in foreign new orders. One is that the expanding automobile production in foreign countries requires our highly-specialized machine tools specifically developed for mass production of automobile parts. Another is that the very large backlogs of foreign builders cause foreign users of machine tools to turn to U. S. builders for faster deliveries."

Foreign Machine Tool Orders Booked in June Amounted to 36 Per Cent of All Bookings. Both Orders and Shipments Up This Year, with 1960 New Orders Pacing Shipments

So much for the order aspects.

Shipments of machine tools in June amounted to a preliminary combined total of \$64.25 million. Broken down, \$49.85 million was in cutting machines—\$38.8 million domestic and \$10.95 million foreign. Forming machine shipments amounted to \$14.4 million—\$12.7 million domestic and \$1.7 million foreign.

In May, total shipments amounted to \$56.35 million. June 1959's shipments, again for both types of machines, combined, totaled \$50 million.

For the first six months of 1960, shipments aggregate \$338.55 million. During the first half of 1959, combined shipments amounted to \$249.15 million. Consequently the rise overall is 36 per cent. Cutting-machine shipments this year at \$265.9 million show a substantial gain of 41 per cent over last year's first half. Forming-machine shipments at \$72.65 million rose 21 per cent over the same period of 1959.

Incidentally, shipments to foreign customers during the first half of 1960 amounted to \$56.9 million, or about 17 per cent of the total machine tool shipments reported thus far this year.

METAL CUTTING AND FORMING MACHINE TOOLS Net New Order Receipts

(Millions of Dollars)

	Foreign			Domestic			Totals Combined
	Cutting	Forming	Total	Cutting	Forming	Total	
1960							
Jan.	\$9.40	\$2.00	\$11.40	\$34.05	\$11.00	\$45.05	\$56.45
Feb.	12.30	1.80	14.10	35.40	11.10	46.50	60.60
Mar.	11.90	2.45	14.35	36.55	11.05	47.60	61.95
Apr.	7.80	3.75	11.55	28.90	11.40	40.30	51.85
May	11.90	5.65	17.55	26.05	6.35	32.40	49.95
June	17.80*	1.95*	19.75*	25.40*	9.85*	35.25*	55.00*
6 Mos.	71.10*	17.60*	88.70*	186.35	60.75*	247.10*	335.80*

* Preliminary.

Source of Statistics: National Machine Tool Builders' Assn.



SAFETY FIRST

for our
school children

This has been provided in the new Kelsey-Hayes "Three-Way Safety Brake System." Now in public school bus fleets, it provides three extra safeguards against possible braking failures.

Universally designed for all buses, this latest product of Kelsey-Hayes research and development is now available for buses, trucks and passenger cars. Kelsey-Hayes Company, Detroit 32, Michigan.

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Automotive, Aviation and Agricultural Parts
Hand Tools for Industry and Home

18 PLANTS: Detroit and Jackson, Michigan; Los Angeles; Philadelphia and McKeesport, Pennsylvania; Springfield, Ohio; New Hartford and Utica, New York; Davenport, Iowa; Windsor, Ontario, Canada.



NEW

PRODUCTION and PLANT

EQUIPMENT

By C. J. Kelly
ASSISTANT EDITOR

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Diamond Tool Lathe

PRIMARILY designed for machining metal components with the use of diamond tools, a new lathe features an infinitely variable speed drive which gives a speed drive selection from 250 to 2250 rpm. Two adjustable anti-friction metal lined steel bearings of long length carry the spindle in this machine, and a V-belt drive is employed. Two sizes are available, 8 in. and 13¼ in., with distances between centers up to 28¼. The feed range for this line is 0.001 to 0.005 ipr. *Milo Mfg. Co.*

Circle 41 on postcard for more data

Testing Machine

A THREE-CHAMBERED low temperature production processing machine has been introduced. This special unit is designed to offer increased versatility in production processing and research testing, by simultaneously providing three separate low temperature liquid refrigerating baths operating at the same or different constant temperatures.

All three chambers are of liquid-tight, heliarc welded 14-ga stainless steel construction. Two chambers measure 14 in. long by 20 in. wide by 24 in. deep and can be independently set to operate at any temperature from -75 deg F to -150 deg F. The third chamber measures 34 in. long by 20 in. wide by 24 in. deep and will operate at temperatures from -70 to -170 deg F.

Refrigerating coils are mounted adjacent to the chamber walls within the baths for maximum heat transfer efficiency. Each bath is also equipped with a ¼ hp vertical agitator to provide uniform temperatures throughout the bath. Net capacity of the dual cascade water-cooled refrigeration system is approximately 5000 Btu/hr at -150 deg F. *Cincinnati Sub Zero Products.*

Circle 42 on postcard for more data

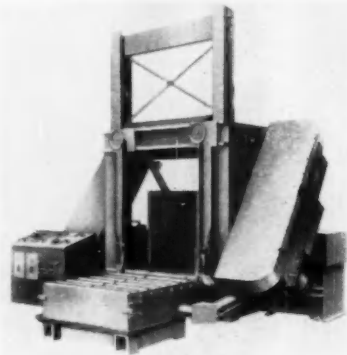
Giant Band Saw

A NEW model horizontal band saw, claimed to be the largest on the market, has a cutting capacity of 40 by 40 in. It is designed to cut

large die blocks, solids, structural steels and other materials.

An "outsized" cast iron guide beam has been added for maximum rigidity and accuracy of cut under heavy load.

The machine features variable

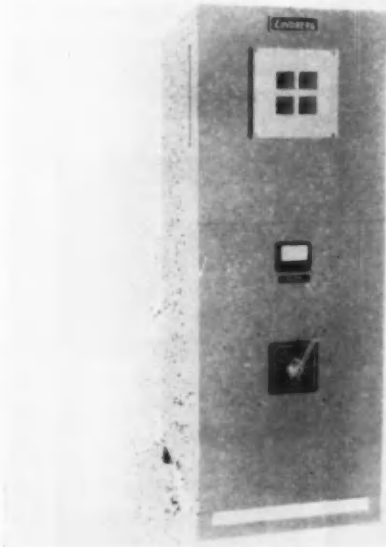


speed drive, large trussed and cross-braced columns, a calibrated valve to set feed pressure, ball bearing blade guides (carbide auxiliary guides optional), 2-hp drive motor and separate hydraulic pump. Production features include a powered conveyor table, hydraulic vise, large coolant pump, and direct reading tachometer which shows blade speed in fpm.

The model T-40 weighs 8,700 lbs., is 109 in. wide, 96 in. deep, 112 in. high. Blade length is 26 ft 9 in. by 1¼ in. by 0.035 in. *W. F. Wells and Sons, Inc.*

Circle 43 on postcard for more data

New Multi-Tube Gaseous Diffusion Furnace



Type G4T14-220S is the designation given to a newly developed diffusion furnace which accommodates four rectangular refractory tubes 2¼ in. wide by 2 in. high. This setup enables maximum production while occupying a minimum of floor space. The maximum continuous operating temperature is 1300 deg C, and the uniform zone is six inches long at ± 2.5 deg C. *The Lindberg Engineering Co.*

Circle 44 on postcard for more data

Motor Protector

The design of this automatic-reset circuit breaker or overload relay is based upon a new concept to achieve pin-point accuracy. Precise calibration is guaranteed by a coordination of bimetal element, heater coil, and infinite contact adjustment. The device will respond to rising temperature and excessive current draw of the motor. It can be built into the motor or used remote attached either to the motor surface, or mounted elsewhere. Rating from 0.1 to 15 amps., up to 230 V AC. *E-T-A Products Co. of America.*

Circle 45 on postcard for more data

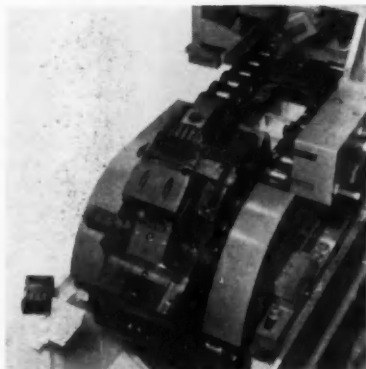
Automatic Screw Driver

THE new JS-60 model is completely redesigned, with a cover housing that protects the inner mechanisms. It is portable to any point of the production line, and can be connected to any suitable air line. Adjustable for use with screws of any diameter from number 2 through 14, the unit is also convertible to any driver such as Phillips, slotted, hexagon, or clutch, and any head style. The driving tool can be operated with either hand, leaving one hand free for positioning or holding the work. The driving unit is connected to the hopper-feeder by pressure and service tubes and permits driver operation up to 20 ft from the feeder mechanism. Thus, the feeder unit can be located at any convenient place while the operator is free to move with a conveyORIZED production line or reach easily into all areas of large assemblies. The driver can be pointed in any direction, even vertically upward and can be set for semi-automatic or full automatic operation at will. *Parker-Kalon Div., General American Transportation Corp.*

Circle 46 on postcard for more data

Twin Chain Drive

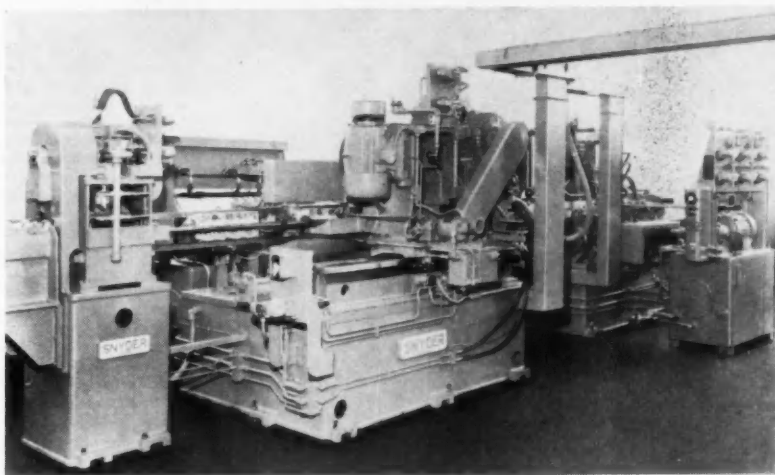
A HORIZONTAL broaching machine which is reported to be the largest continuous broaching machine ever built was designed for high production operations. It utilizes powerful twin chain drive to pull workholding fixtures through a tunnel that is equipped with a series



of broach cutting tools. Close tolerances from 18 to 25 microfinish are maintained with this unit. According to the manufacturer this machine will produce 182 finished steering gear ball nuts per hour. This rate is obtained from nine fixtures that travel at 13.6 fpm. *The Detroit Broach and Machine Co.*

Circle 48 on postcard for more data

Eight Station Special Transfer Machine



A new eight-station 24-ft long special transfer machine that rough mills the cover face, exhaust bosses, construction bosses, joint face and intake face of aluminum automotive engine cylinder heads at a rate of 120 pieces per hour at 100 pct. efficiency has been designed.

MACHINING of aluminum on this transfer machine required that the milling spindles turn at speeds providing 5000-sfpm. Coolant is fed to the work through hollow spindles to improve flow to cutting edges. Recirculating oil systems in the Snyder special milling head cuts head size and reduces bearing heating problems.

To avoid marking of the faces of the cylinder heads with the milling

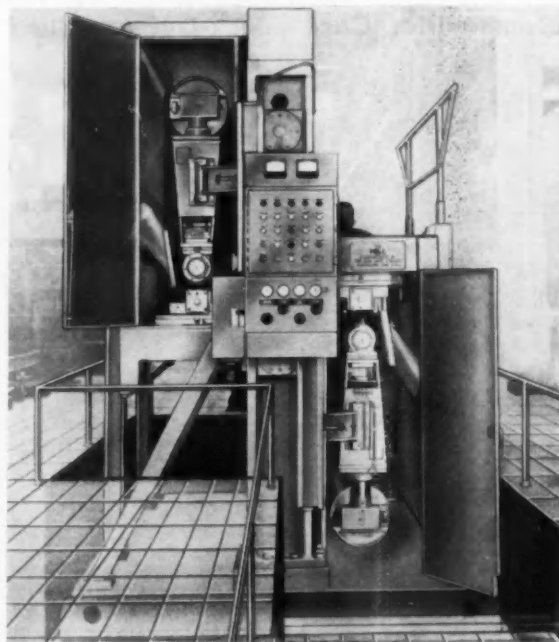
cutters by returning them to start position past the milled surface, milling heads feed against the direction of part travel through the machine. Thus, when a part is milled in a station, the milling cutter is behind the part it has milled. During transfer, the cutter returns to start position behind the finished part that is being transferred to the next station. *Snyder Corp.*

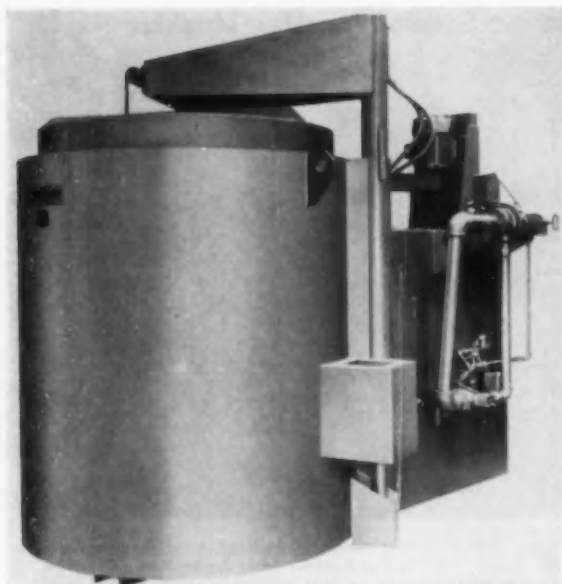
Circle 47 on postcard for more data

Double Side Strip Grinding Machine

This machine is designed to process 54 in. wide stainless steel strip and grind both sides of the strip simultaneously eliminating the need of turning the coiled strip as in the usual grinding operation. Two standard 2-Roll Vertical Abrasive Belt grinding heads are used—one head in the normal position. Each head is driven by a 125 motor and uses a 56 in. wide abrasive belt. Thirty-six inches of the machine is below floor level to reduce the pass line of the stainless steel strip. Total overall machine height is approximately 13 ft. *The Hill Acme Co.*

Circle 49 on postcard for more data





This unit is designed to meet severe operating conditions and provide accuracy in lower range heat treating. A convection furnace, air is heated in a combustion chamber and then circulated through the loaded furnace chamber. Specific applications are in tempering, drying, annealing as well as solution treatment and aging operations. Two temperature ranges are available. One range provides a maximum temperature of 1350 deg F., while the other has a maximum range of 1700 deg F.

Gas or Electric Pit Type Air Draw Furnace

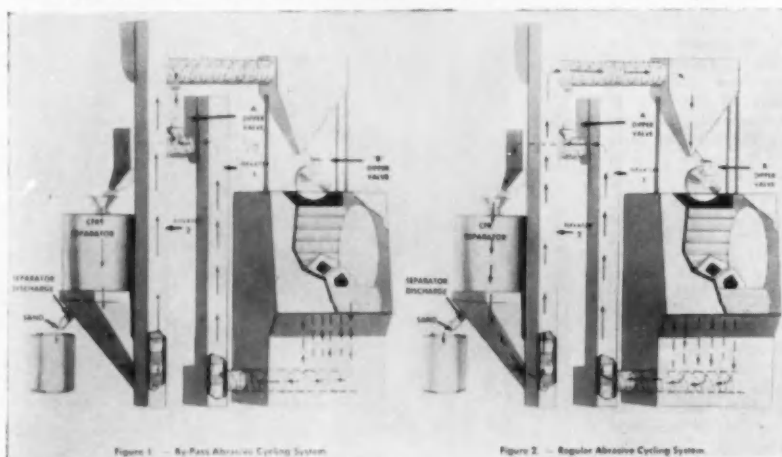
SEVERAL design features are incorporated in this furnace to increase product quality and boost production efficiency. Carefully controlled combustion equipment or electric heating units maintain loads at specified treatment temperatures. A high speed fan rapidly circulates heated air at a high static pressure to quickly bring the furnace up to operating temperature and assure even temperature and pressure distribution. Fast, thorough heating is achieved, even in

dense loads.

Parts may be suspended, fixtured or placed in baskets for treatment in the Rotair, as it has been named. Top loading allows easy access with an overhead crane, and enables lengthy shafts or heavy parts to be placed, suspended and removed rapidly. Cover operation features pneumatic lift, manual swing out for easy access to the chamber. *Hevi-Duty Electric Co.*

Circle 50 on postcard for more data

Combination Core Knock-Out and Blast Cleaning Unit



Abrasive separation and a double elevator design, with two abrasive cycling systems, offers a single machine to knock out cores and clean castings. A whole new line of double action equipment is available to core knock-out in one cycle and airless blast cleaning in the other, both in the same machine with a single loading and unloading operation. *The Wheelabrator Corp.*

Circle 51 on postcard for more data

Small Parts Feeder

A COMPACT low cost parts feeder unit has now been added to a line of vibratory parts feeders. It is especially designed for the smaller or miniature type parts of less than 1/2 in. in length.

The unit is complete with built-in control and interchangeable bowl of 7 in. dia. Over-all height of 6 1/2 in. and mounting base is 8 in. square. The cast aluminum bowl has built-in self-aligning feature.

Its design follows the Burklyn Standard 11 in. model which allows easy orientation at the lathe and eliminates the more expensive handling by milling operation, according to the manufacturer's report. *The Burklyn Co.*

Circle 52 on postcard for more data

Plasma Generator

HIGH-TEMPERATURE sources ranging from 2500 to 12,000 deg F and above have been developed for general laboratory and production use. Powdered by a standard welding generator, the new unit is a small plasma generator that may have a wide application as a low-cost research and production tool.

By using the plasma generator, techniques may be developed to flame-spray refractory oxides and ceramics onto other materials to greatly increase their refractory properties. The unit can be fired into a vacuum or pressure chamber without major modification.

In flame spraying, the material is fed as a powder into the flame, becomes liquid and is hurtled in fine, spherical droplets against the surface to be plated. Initial ceramic spraying experiments have shown that a slightly porous coating is deposited which improves the specimen's surface thermal insulating properties and resistance to thermal shock.

Basically the unit is a high intensity electric-arc consisting of a water cooled tungsten cathode designed to reduce contamination to insignificance, and a copper anode. It is 2 1/4 by 9 in. long and weighs 3 1/2 lb. The jet can be varied by changing nozzles which are available in 0.25 to 0.50 in. inside diameter. Standard nozzle size is 0.375 in. inside diameter. The unit can also be equipped with a pistol grip handle to develop techniques for arc plasma flame cutting and other applications. *Avco Research and Advanced Development Div.*

Circle 53 on postcard for more data

Redesigned Press Line

ICLINABLE presses, available in 22, 35, 45 and 60-ton capacities, known as the Big "C" Series, incorporate changes in dimensions and specifications over previous models. One of these innovations is a redesigned cast Meehanite frame. Besides the improved frame, there has been a general upward revision of virtually all press and component dimensions. The bed opening, space between uprights, and throat depth are all larger than in previous models. The crankshafts are unusually large, with diameters as much as 25 to 35 pct greater at the crankpin. There is longer slide adjustment on the larger sizes of the new series with exceptional ease of locking and a very strong connection. The Bliss ball-type connection screw is similar to that used on the Company's high-production presses. The liberal size of the bronze ball seat and ball cap provide full working surfaces for the connection screw, while laminated shims make it possible to maintain proper ball clearance at all times. *E. W. Bliss Co.*

Circle 54 on postcard for more data

Sub-Surface Indicator

THIS device was developed as an adapter for a surface measurement unit to enable it to measure the bottom of slots, grooves, holes and counterbores. It operates in the zero to 250 microinch range. It will



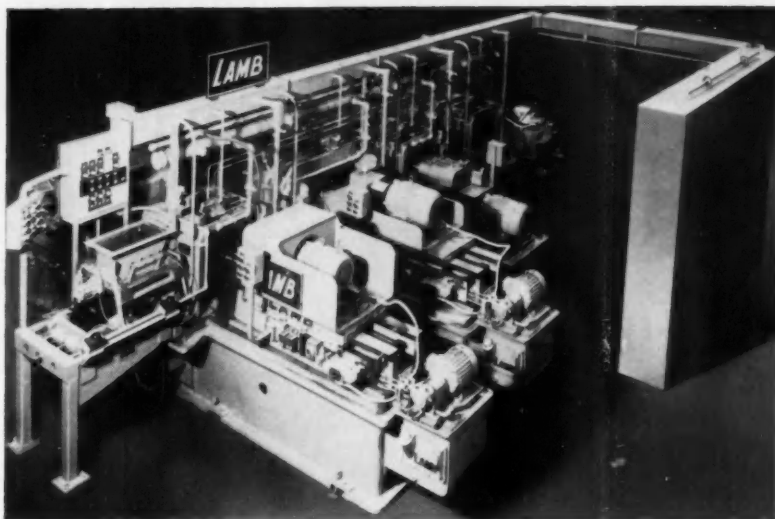
check the bottom of holes as small as $\frac{1}{16}$ in. ID, to a maximum depth of one inch. Larger holes can be measured to a depth of two inches. This adapter was designed to be used with the Brush Surfindicator which measures surface finishes. *Brush Instruments, Div. of Clevite Corp.*

Circle 55 on postcard for more data

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**

AUTOMOTIVE INDUSTRIES, August 15, 1960

Hopper-Fed Six Station Transfer Machine



A new six-station, in-line transfer machine incorporated the use of a hopper to meter and feed steering tie rod adjustable sleeves to the transfer mechanism. There are four machining stations plus load and unload stations. Operations performed are: core drill both ends, mill slots both ends, tap one end, tap opposite end. The production rate is 625 pieces per hour at 100 pct efficiency. *F. Jos. Lamb Co.*

Circle 56 on postcard for more data

Special Drilling and Milling Machine for Auto Parts

MILLING and drilling operations on connecting rods and caps is performed on a special machine that features eleven stations.

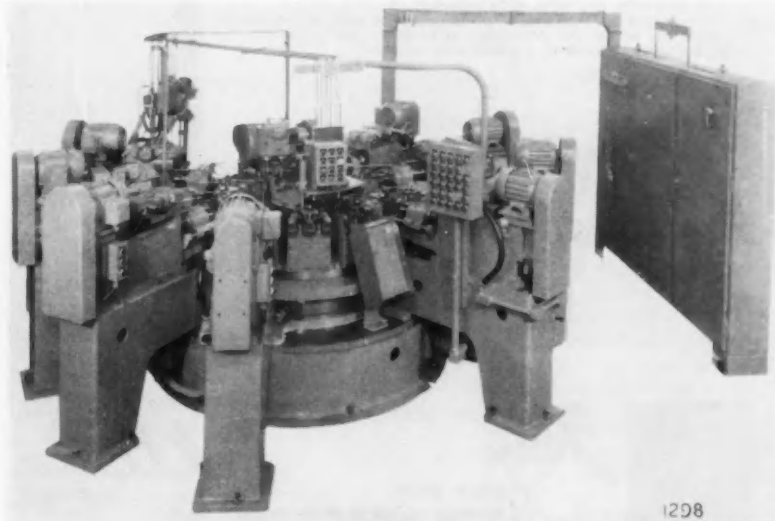
In each rod and cap, two oil holes are drilled and countersunk and a notch is milled. The holes are first spot drilled to form a countersink and three drill passes are taken for the drilling of the oil holes.

The operator manually places two rods and two caps in the fixture and

at the unloading station, number 11, the rods and caps are automatically ejected. The machine employs eight self contained hydraulic quill units each with a two spindle head for the drilling operations.

For the milling operation, a special mill head is provided to mill a notch in each rod and cap. The mill head is mounted on an 8 in. hydraulic slide. *Rehnberg-Jacobson Mfg. Co.*

Circle 57 on postcard for more data



Cycle time of this eleven station machine is 10.5 seconds.

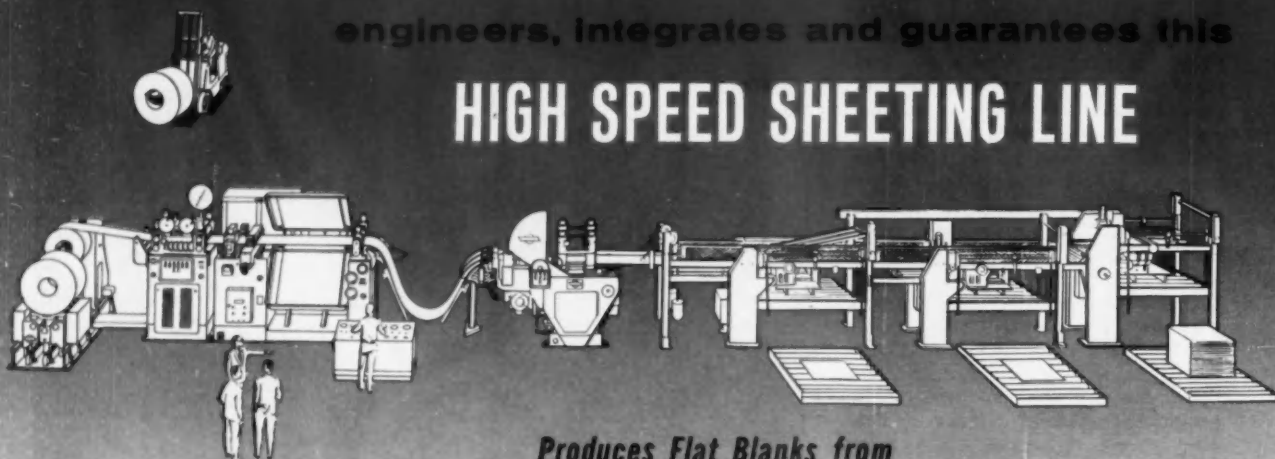
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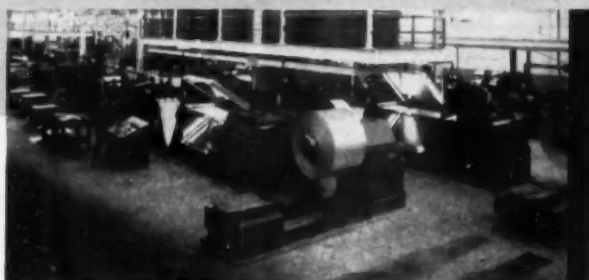
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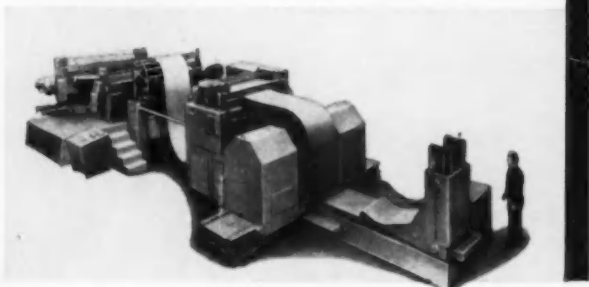


TYPICAL LITTELL TINPLATE SHEETING LINES

At Crown Cork & Seal Company, these lines convert coil stock into flat sheeted tinplate, cut square, and to accurate lengths, in one continuous, automatic operation.

TYPICAL LITTELL TRAPEZOID SHEETING LINE

For The Budd Company, this Littell Trapezoid Sheeting Line converts heavier coil stock into custom cut rectangular, parallelogram and trapezoidal flat blanks for subsequent stamping and drawing operations.



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Littell engineers and guarantees the five complex individual units in the line to operate as one. Each unit is integrated and synchronized, one with the other, to produce flat blanks from mill coils faster, more accurately and at lower cost than has been possible before. Littell guarantees a tolerance of $\pm .007$ " in length and squareness in producing blanks up to 36" long at the rate of 75 blanks per minute. You get this accuracy on paper-thin .0055" tinplate or steel stock .020" thick. Operation is automatic, controlled by one man. Imperfect blanks are automatically rejected by electronic controls. Can manufacturers report the Littell line's scroll cutting efficiency saves six percent in material.

Whether you work thick or thin stock, a Littell Sheeting Line can work to your advantage and quickly pay for itself. Let's talk it over. Phone or write.



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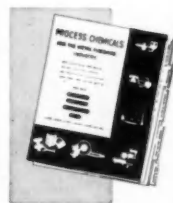
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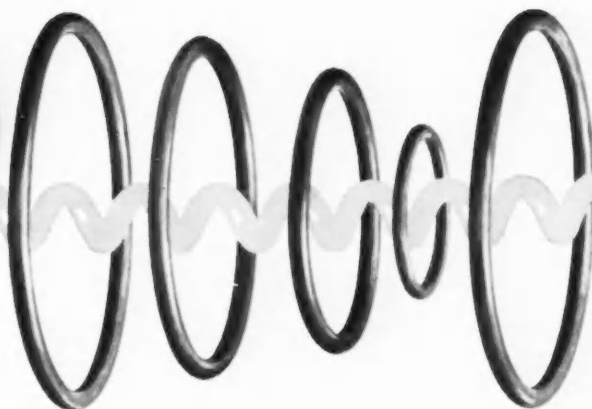
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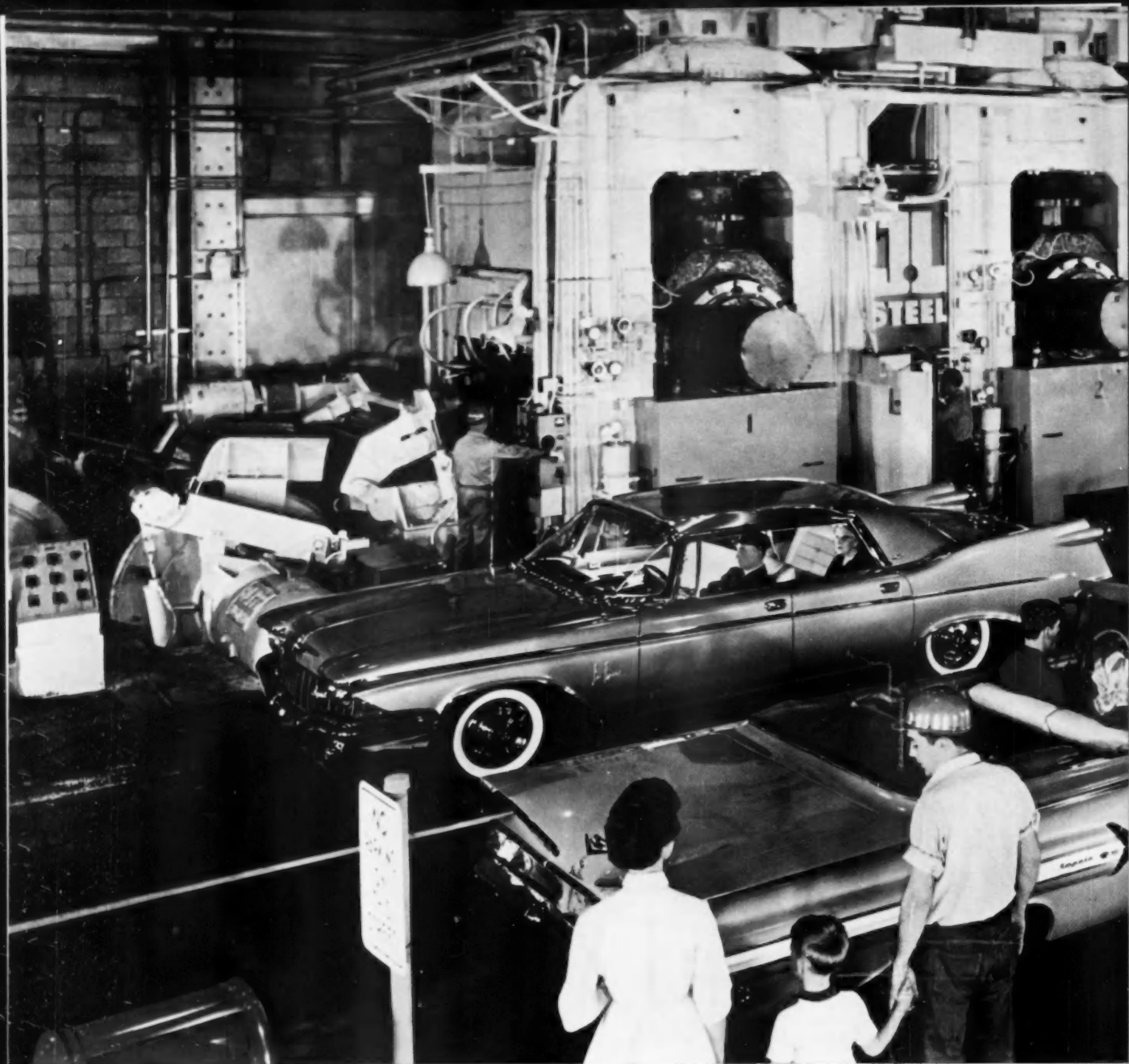
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Traffic scene staged at new four-stand tandem cold reducing mill in J&L's Cleveland Works.

Photo: d'Arazién

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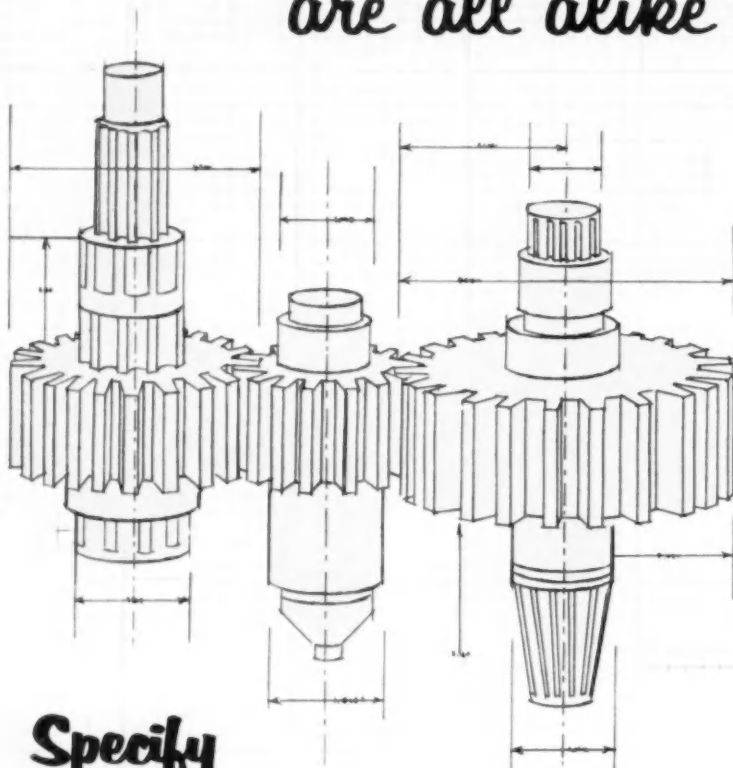


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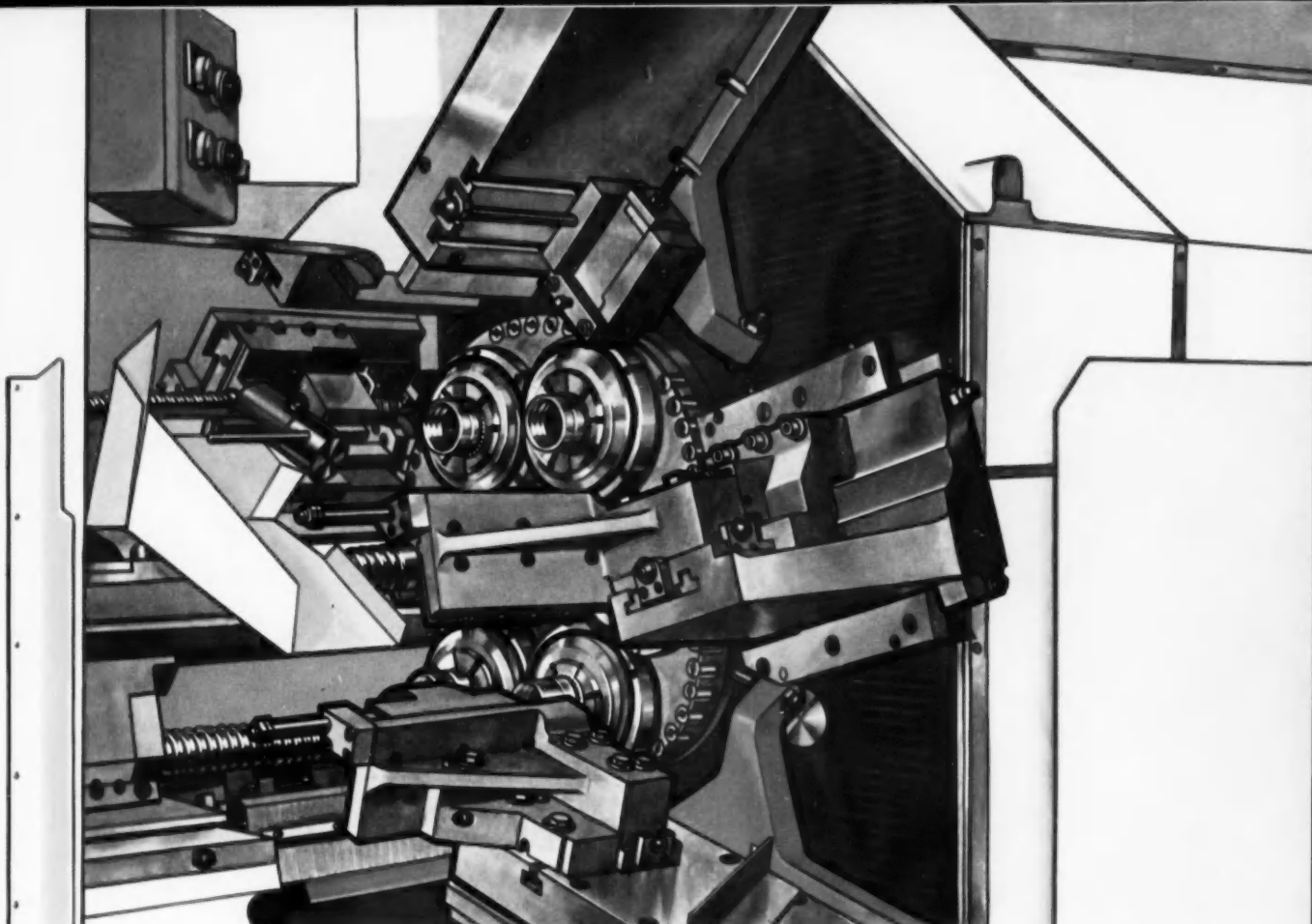


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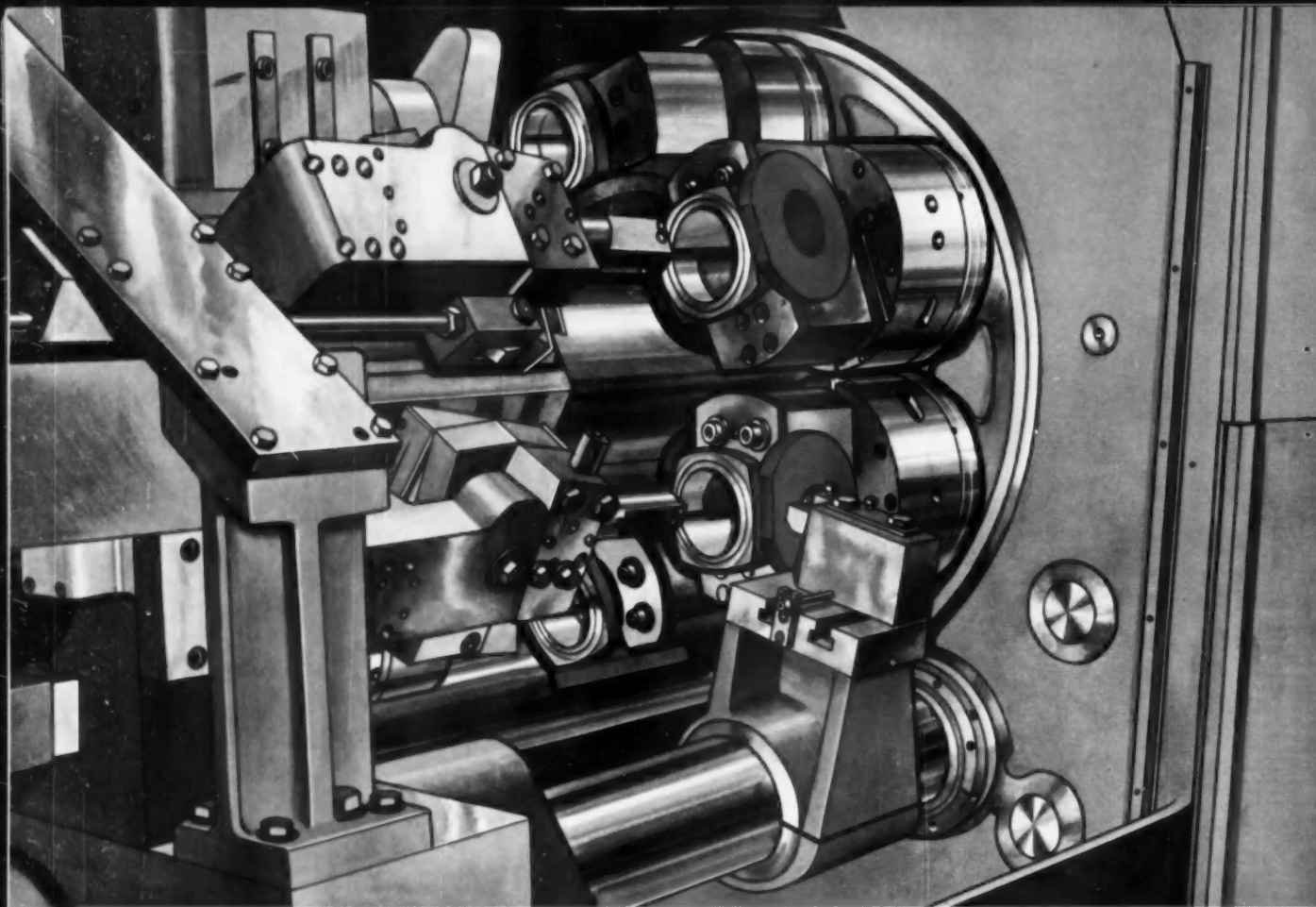
Model 450. Four spindles, $5\frac{1}{8}$ " maximum capacity, four independently operated radial cross slides.

Model 635. Six spindles, $3\frac{1}{2}$ " capacity, with independent radial cross slide in every position.

Model 826. Eight spindles, $2\frac{5}{8}$ " capacity. Six independently operated cross slides with the two lower slides exceptionally wide to provide elevating blocks for cross slide tooling in the number 3 and 8 positions.

Inexpensive, disc-type cams provide positive actuation of cross slides. Cross slide and end-working tools on all models are easily accessible. All models have positive spindle carrier lifting, locating and locking. New catalog material will give you further details on these machines. Your New Britain representative can show you how the increased profitability built into them can improve your competitive situation. Plan to see him soon.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division • New Britain, Connecticut



Capacity up to 15" on New Britain chuckers

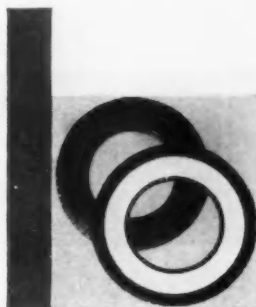
We are going to take it for granted that *you* take New Britain chuckers for granted—as the leading make of multiple spindle automatics. Most people do. The big news then is that the profitability of these famous machine tools can now be applied to an increased range of work. The new New Britains are available with chucking capacities up to 15", which enables you to apply New Britain standards of speed, accuracy and versatility to larger work.

The 15" capacity applies to four-spindle models. Six-spindle machines will take pieces up to 12", and eight-spindle chuckers will handle up to 10".

If you work with large castings and forgings, this might be the announcement of the decade, in terms of an investment that can't fail to be profitable. With equipment like this properly adapted to your particular requirements, nobody, anywhere, is going to trim you on cost per piece.

Call on your New Britain sales engineer for practical, specific information, of course. Meanwhile, we have just published a new catalog on these new large capacity chuckers, and we would be happy to mail your copy to you on request. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Conn.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division • New Britain, Connecticut



HYPALON[®]

SYNTHETIC RUBBER



...the best answer to many automotive design problems

HYPALON synthetic rubber provides qualities not available in conventional elastomers for automotive design problems. HYPALON can be compounded to give a completely ozone-proof and color-stable elastomer with excellent weather, abrasion, oil and heat resistance.

This unique combination of properties has made HYPALON the choice of many design engineers for a variety of automotive applications—ignition cables, spark plug boots, coatings for door and deck lid seals, coatings for headliners, replacement convertible tops, and for white tire sidewalls.

Investigate the design advantages of HYPALON. It is currently being used for coating fabrics, for molded and extruded goods and for solution coatings in a range of nonstaining colors. For more information, call your rubber supplier or write E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department AI-8, Wilmington 98, Delaware.



SYNTHETIC RUBBER

NEOPRENE HYPALON[®] VITON[®] ADIPRENE[®]

Better Things for Better Living . . . through Chemistry

NEW

PRODUCTS

AUTOMOTIVE-AVIATION

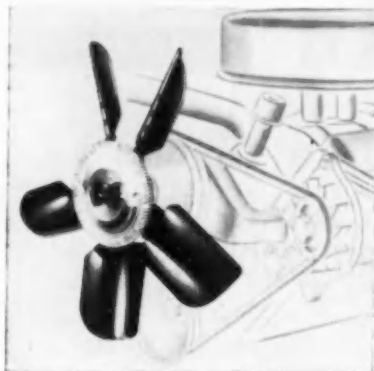
FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

Cooling System Device

This device has been designed to increase the efficiency of automobile cooling systems while at the same time saving engine horsepower and reducing fan noise. It is currently being used in connection with air conditioning systems on nine makes of automobiles. The reason for the product's initial popularity in air conditioning is due to the severity of the cooling problems and the drain on engine horsepower associated with air conditioning of cars.

The product is called Visco-Drive, a name derived from the fact that the device utilizes a silicone fluid coupling between the engine drive pulley and the fan. The unit is used with a



high capacity, multiple blade fan mounted on the front part of an automobile engine. The mechanism increases the flow of air through the cooling system at low speeds and reduces it at high speeds. At low speeds, the fluid coupling acts as a direct drive. As engine speed increases, controlled slippage occurs causing the fan to be held at a predetermined speed to give peak efficiency.

There are two types of this unit—the Torqatrol, a non-temperature sensitive device; and Tempatrol, a temperature sensitive device. Torqatrol is used on six different 1960 models, and Tempatrol on three models, with two others planning to use it on 1961

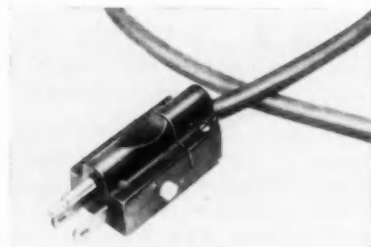
car models. Torqatrol is the torque-regulated version of the Eaton fan drive without thermostatic control. At low engine rpm, the fan operates at driven speeds. As engine speed increases, the viscous drive slips, limiting the maximum fan speed. This limit can be raised or lowered to suit the needs of specific installations. The clutch, or coupling as the drive is called, transmits torque through shear of silicone oil by mating sets of annual grooves. The number of grooves and viscosity of the oil determine its torque capacity.

Tempatrol, like Torqatrol, is a torque-limiting coupling which similarly operates through shear of silicone oil. It is an air sensing device taking its control from the temperature of the air that has just passed through the radiator. When the under-hood temperature is below the thermostat setting, the slide-valve closes, the fluid-drive chamber empties out, and the fan idles. *Eaton Mfg. Co.*

Circle 60 on postcard for more data

Motor Protector

A MINIAURE circuit breaker has been designed specifically to protect small motors in portable power tools and appliances. This device attaches to end of cord to protect motor from burning out due to overload or overwork. It will automatically cut off

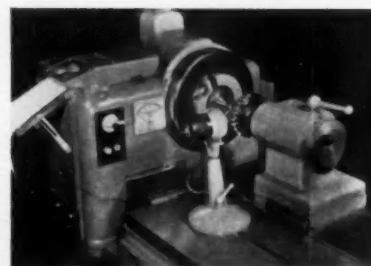


the power when a unit is overloaded or over-worked, and a reset button, instead of fuses, is used to reset the circuit breaker. It is available from 3 to 10 amps. *Modern Mfg. Co., Inc.*

Circle 61 on postcard for more data

Optical Lead Checker

THE Model 1218-A lead checker, incorporates optical instrumentation for setting both the universal sine bar and an angular dividing head, not normally included in such a checking machine. This checker is independent of the operator's "touch"



since all settings are visual. Angles can be set within 0.001 deg without use of gage blocks.

With new components incorporated in this lead checker, it is possible to do conventional continuous checking, or increment checking through use of the scale on the tail-stock. Leads of external or internal helical, spur and herringbone gears, and worms can be checked from zero to infinity.

A chart recorder is integrally mounted in the headstock of the machine so permanent records can be made of tests. A transistorized amplifier drives the recorder pen or a large-scale electronic meter graduated in ten-thousandths. *Michigan Tool Co.*

Circle 62 on postcard for more data

Transistorized Instrument

A COMPLETELY transistorized battery-operated ultrasonic instrument for measuring wall thickness between 0.025 and 2.50 in. has been added to a line of test systems. The portable unit, designated Sonizon SO-300, gives instantaneous reading by placing a transducer on the surface to be measured and turning a dial. *Magnaflux Corp.*

Circle 63 on postcard for more data

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period July 2 to July 27, inclusive.

SPECIAL PRODUCTS DIV. OF AMERICAN MOTORS CORP., Detroit, Mich.
1,000 one quarter-ton vehicles—\$3,150,000

LYCOMING DIV., AVCO CORPORATION, Stratford, Conn.
Gas turbine engines—\$20,213,292

BENDIX-PACIFIC DIV. OF BENDIX AVIATION CORP., North Hollywood, Cal.
Fabrication of mobile position fixing system—\$1,930,526

BLAW-KNOX CO., CONSTRUCTION EQUIPMENT DIV., Mattoon, Ill.
Truck, lift, 111 ea—\$67,710

BUTLER MFG. CO., Kansas City, Mo.
Truck, tank, 13 ea—\$231,645

CARLISLE CORP., Carlisle, Pa.
Aircraft tubes, 16692—\$212,046

CINCINNATI MILLING & GRINDING MACHINE, INC., Cincinnati, Ohio
Machine—\$313,842

THE INDUSTRIAL TRUCK DIV. OF CLARK EQUIPMENT CO., Battle Creek, Mich.
195 special fork trucks—\$3,623,367

COLLINS RADIO COMPANY, Dallas, Texas
Communication equipment for mobile use in motor vehicles—\$1,314,588

COOPER TIRE AND RUBBER CO., Findlay, Ohio
Tube, 17461 ea—\$69,669

DAKOTA FIRE APPARATUS CO., Brookings, S. Dak.
Truck, fire fighting, 11 ea—\$137,753

DELAWARE VALLEY MACHINERY, INC., Willow Grove, Pa.
Boring, drilling and milling machine—\$84,848

DELAWARE VALLEY MACHINERY, INC., Willow Grove, Pa.
Two ea lathes—\$45,133

DEVILIEG MACHINE CO., Royal Oak, Mich.
Machine, jig boring & milling—\$56,430

DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.
Missile transporters—\$1,363,676

DEFENSE PRODUCTS DIV., THE FIRESTONE TIRE & RUBBER CO., Akron, Ohio
Aircraft tires, 3651 ea—\$443,604

DEFENSE PRODUCTS DIV., THE FIRESTONE TIRE & RUBBER CO., Akron, Ohio
Aircraft inner tubes, 1400 ea—\$33,534

EMERSON ELECTRIC MFG. CO., St. Louis, Mo.
Weapon system—\$4,177,050

FORD MOTOR CO., GOVERNMENT SALES DEPT., Washington, D. C.
Trucks, 18 ea—\$59,445

FRAZER & CO., INC., New York, N. Y.
Various items of agricultural equipment—\$70,003

FRUEHAUF TRAILER CO., Detroit, Mich.
Trailer, van, 24 ea—\$79,941

GARWOOD INDUSTRIES, INC., Wayne, Mich.
Semitrailer, Rear Dump, 7 ea—\$58,954

GENERAL ELECTRIC CO., Burlington, Vt.
Missile weapons systems—\$3,394,061

GENERAL ELECTRIC, JET ENGINE DEPT., Schenectady, N. Y.
Development—jet engine—\$6,200,000

GENERAL MOTORS CORP., CHEVROLET MOTOR DIV., Detroit, Mich.
Trucks, 527 ea—\$910,885

THE GENERAL TIRE & RUBBER CO., Akron, Ohio
Aircraft tires, 1000 ea—\$180,390

THE GOODYEAR TIRE AND RUBBER CO., Akron, Ohio
Tires, 26444 ea—\$1,583,400

THE GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Aircraft inner tubes, 4289 ea—\$130,670

HAMILTON TRAILER CO., INC., Hamilton, Texas
Semitrailer, 10 ea—\$68,537

HARRINGTON-WILSON-DAUM CORP., Mt. Vernon, N. Y.
Lathe, engine—\$32,160

HYSTER CO., Portland, Ore.
2 top lift attachment and 2 forklift trucks—\$28,724

HYSTER CO., MARTIN TRAILER DIV., Kewanee, Ill.
Semitrailer, lowbed, 7 ea—\$207,166

INTERNATIONAL HARVESTER CO., Washington, D. C.
Trucks, 53 ea—\$260,541

KEARNEY & TRECKER CORP., Milwaukee, Wis.
Machine, milling—\$164,736

MACHINERY ASSOCIATES, INC., Wynnewood, Pa.
Lathe—\$33,742

MET-PRO, INC., Lansdale, Pa.
6-ton, 4-wheel semi-trailers—\$1,499,500

MINNEAPOLIS MOLINE CO., Hopkins, Minn.
Tractor, 277 ea—\$623,250

MINNEAPOLIS - MOLINE COMPANY, Hopkins, Minn.
Fork lift trucks and towing tractors—\$2,600,000

LUCAS MACHINE DIV., NEW BRITAIN MACHINE CO., Cleveland, Ohio
Machine, boring, milling and drilling—\$48,500

NELSON MUFFLER CORP., Stoughton, Wis.
Muffler, engine exhaust, 3902 ea—\$36,483

THE OLIVER CORP., Chicago, Ill.
Tractor, wheeled, 9 ea—\$40,352

OSHKOSH MOTOR TRUCK INC., Oshkosh, Wis.
Trucks, 1 ea—\$11,815

PRATT AND WHITNEY DIV., OF THE UNITED AIRCRAFT CORP., East Hartford, Conn.
Continued development of the J-52 turbojet aircraft engine—\$11,200,000

ROGERS BROS. CORP., Albion, Pa.
Semitrailer, 10 ea—\$36,817

THE FRANK G. SCHENUIT RUBBER CO., Baltimore, Md.
Aircraft inner tubes, 8200 ea—\$69,756

THE FRANK G. SCHENUIT RUBBER CO., Baltimore, Md.
Aircraft Tires, 1185 ea—\$231,513

SPENCER - SAFFORD LOADCRAFT, INC., Augusta, Kan.
Trailer, tanks, 424 ea—\$585,921

STEWART STEEL PRODUCTS, INC., Brooklyn, N. Y.
Truck, lift wheel, 45 ea—\$76,510

STUDEBAKER-PACKARD CORP., South Bend, Ind.
Automobiles, 45 ea—\$71,127

THE TROYER CORP., Scranton, Pa.
Trailer, cargo, 322 ea—\$311,696

UNITED STATES RUBBER CO., Detroit, Mich.
Aircraft tires, 1223 ea—\$250,449

UNITED STATES RUBBER CO., Detroit, Mich.
Aircraft Inner Tubes, 5000 ea—\$44,700

UTILITY TOOL AND BODY CO., INC., Clintonville, Wis.
Chassis, trailer, 250 ea—\$321,032

WARD LaFRANCE TRUCK CORP., Elmira Heights, N. Y.
Truck, 19 ea—\$475,746

WATSON AUTOMOTIVE EQUIPMENT CO., Arlington, Va.
Trucks, 2 ea—\$16,473

REO DIV. OF WHITE MOTOR CO., Lansing, Mich.
2,082 2½-ton trucks—\$12,499,796

WILLYS MOTORS, INC., Toledo, Ohio
5,228 "Jeep" vehicles—\$9,700,000

WILLYS MOTORS, INC., Toledo, Ohio
Trucks, 5270 ea—\$8,838,799

WISCONSIN MOTOR CORP., Milwaukee, Wis.
Engine, gasoline, 149 ea—\$71,032

AUTOMATIC TRANSPORTATION CO., DIV. OF YALE & TOWNE MFG. CO., Chicago, Ill.
Truck, fork lift, 82 ea—\$398,672

ArmaSteel Crankshaft Automatic Setup

(Continued from page 65)

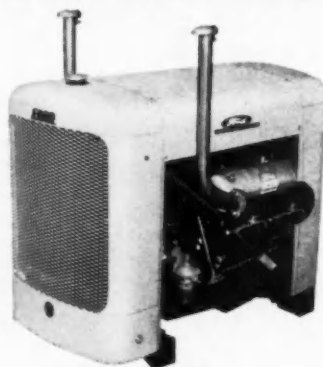
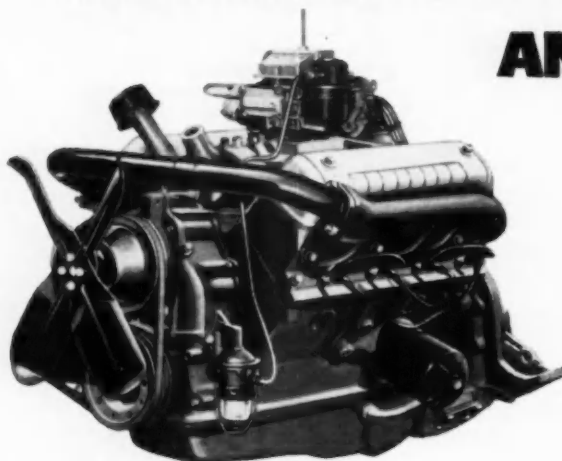
sure proper surface hardness. Crankshafts also are subjected both to sonic and ultrasonic probing for internal soundness. In the sonic test the work is lowered into the test chamber and automatically struck with a metal hammer. The resulting tone is compared with an established frequency in an electronic cabinet.

Ultrasonic probing is accomplished by immersing the crankshaft in water and subjecting it to the action of the high frequency sound waves. This is considered to be an excellent check for internal soundness.

Supplementing these production inspections is radiographic inspection by means of a 30-Curie Cobalt 60 unit. This equipment has a dual purpose: prior to production release it is employed to determine the best possible gating of pattern equipment. During the course of routine production it serves as a sampling check of castings for internal soundness. ■

Announcing the rugged **FORD 292 V-8** **INDUSTRIAL ENGINE**

AND POWER UNIT!



**For every power need . . .
a complete line of Ford Engines, ranging
from 134- to 534-cu. in. displacement!**

New, but no rookie in dependable, proven performance . . . the 292 Heavy Duty V-8 is built with Ford's characteristic attention to *advanced engineering*—based on years of Industrial Engine know-how! And it's available as a new economical foot- or skid-mounted power unit.

The 292 V-8 combines long-lived dependability with peak performance. These are counterbalanced engines . . . rugged, yet compact . . . economical, yet powerful . . . advanced, yet proven!

Ford Industrial Engines offer features like *rigid Deep-Block construction* that cuts vibration to the bone . . . *Short Stroke Design* for fuel economy and more usable horsepower . . . *Full-Flow oil filter* that cleans *all* the oil . . . and *Free-Turn valves* for longer valve life and improved seating.

The summation: More horsepower per pound of engine weight than ever before possible! *All this* in a line of engines that range from 134 to 534 cubic

inches, including three Super Heavy Duty V-8's and three economical Diesels. Most engines are available as engine assemblies or complete power units. Gasoline models can be adapted to LP-Gas or natural gas fuel.

And don't forget that low-cost Ford parts are as near as your closest Ford Power Dealer for economical service *when you need it!*

Whatever your business, whatever your equipment . . . there's a Ford 4-, 6- or 8-cylinder engine that's right for your job. See your Ford Industrial Products Dealer today!



INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:

→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.

→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.



Geared by Fuller . . . Transcon's White-Freightliner Tractors, featuring Cummins NH-220 Diesel Engines and Fuller 5-CA-72 5-speed Transmissions, help speed shipments along routes extending from the Pacific Coast as far east as Chicago and Atlanta.

Lightweight Freightliners boost *transcon's* payloads with 5-CA* 72 transmissions

* Aluminum case and clutch housings.

To combine maximum performance with increased payloads, Transcon Lines, Los Angeles, recently purchased 100 White-Freightliner Diesel Tractors equipped with Fuller 5-CA-72 Transmissions. The 5-speed Transmissions help Transcon carry bigger payloads because the aluminum alloy

case and clutch housing of the 5-CA-72 cut transmission weight 93 pounds.

The Fuller Transmissions have proven reliable, too. Transcon has been able to extend preventive maintenance transmission rebuild cycles from 150,000 to 275,000 miles because of trouble-free 5-CA-72s.

Transcon's satisfaction with the 5-speed lightweight transmissions is emphasized by the fact that the company's line equipment is equipped entirely with Fuller Transmissions.

Ask your truck dealer about the Fuller which is engineered to put more profit in *your* operation.

FULLER

TRANSMISSION DIVISION
MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN
Subsidiary EATON Manufacturing Company

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.
Automotive Products Company, Ltd., Automotive House, Great Portland Street, London W.1, England, European Representative

Meet the AI By-Liners



A brief biographical sketch of the editors and contributors to AI whose by-lines appear regularly

Introducing Marcus Ainsworth

MARCUS (Mike) AINSWORTH, Statistical Editor of *AUTOMOTIVE INDUSTRIES*, has been with Chilton Company for a period of 31 years. He is perhaps best known as the compiler of that imposing compendium of automotive facts, figures, charts and graphs—the AI Annual STATISTICAL ISSUE.

The Statistical Issue is published each March 15th, affording AI readers the most unparalleled, concentrated, and complete source of automotive manufacturing information ever annually presented under one cover. Into each "Stat Issue" goes almost a year's effort on the part of Mike and his staff, to present all pertinent up-to-date data on automotive engineering, production, and design.

All told, he is Statistical Editor of four other Chilton magazines besides AI. These are *Commercial Car Journal*, *Motor Age*, *Aircraft & Missiles*, and *Distribution Age*.

Before coming with Chilton, Mike served in the Commercial Survey Dept. of the Bell Telephone Co. Prior to that he served in the Engineering Dept. of the Pennsylvania R.R. His first job at Chilton was in Marketing Research.

Mike studied civil engineering at Swarthmore College; entered World War I in 1917.

Besides organizing, establishing and operating the Statistical Dept. at Chilton, Mike is editor of *MOTOR AGE's Automotive Marketing Guide*—applicable to the automotive after-market.

Silencing Techniques at Rover Plant

(Continued from page 78)

swivel axle in rubber. In addition, the radius arms are rubber bushed at their frame ends.

Girling disk brakes are used in front, and their tendency to squeal has been effectively countered by

wrapping a single coil of heavy wire around the disk circumference. The wire is tightly seated in a machined groove and retained merely by a single butt weld joining the ends.

Sub-frames are assembled on an oval circuit with ten rail-mounted dollies. Here the pre-assembled suspension units are added together with the steering gear, and the wheel hubs are roughly aligned.

Vacuum servo, horns and engine mounting blocks follow, after which the engine and gearbox are dropped into position, and the torsion bars are installed and set.

The completed sub-frame is then conveyed by hoist to the start of the adjacent final assembly line. The rear suspension and axle, likewise placed on the track at this point, is also noteworthy for the attention paid to road noise elimination.

Leaf springs are rubber-mounted at both ends, the front being secured by a cylindrical rubber bushing of 1-13/16 in. diameter pressed into the eye. Internally the bushing is eccentric, for the sleeve for the body-attachment bolt is offset to the upper side. This arrangement puts most of the rubber on the under side, which takes the load, in order to maximize noise insulation, while the portion directly above the sleeve is deeply grooved axially to aid stretching and flexing.

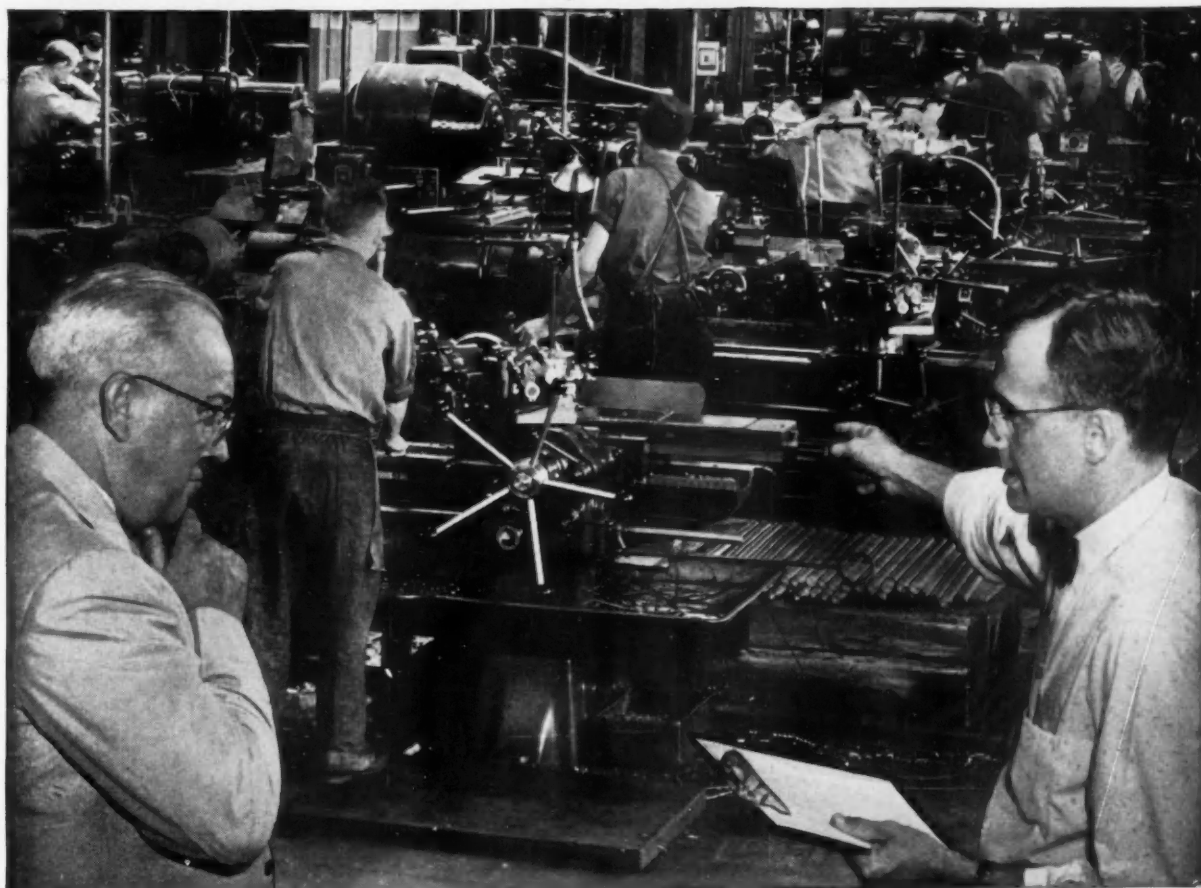
Prototype 3-liter models had conventional rear shackles, but Rover engineers found that these formed a path to the unitized body for road and axle noises. After various trials the shackle was replaced by the present Siamesed rubber cushions, molded in cylindrical pairs joined at the top with axes spread 120 deg apart. Circular plates bonded to each angled face join the unit to the body through a mounting bracket in the form of an inverted V, while the end of the main leaf is bolted to the triangular central member.

These units deflect readily as the spring flattens on a bump, but are very resistant to sideways motion. Although no failures have been recorded, simulated destruction tests have shown that even when both rubbers were severed the spring and axle were held in position on the rebound by the shock absorber, and, it is stated, there was no apparent change in the ride.

The semi-elliptic springs are packed with grease and enclosed in plastic sheeting on assembly. As a matter of interest, all suspension joints and steering pivots on this model are either rubber bushed or permanently sealed, and the only

(Turn to page 128, please)

"Yes this was a modern shop in 1939 — but..."



Why wait for new machine tools?

Now you can buy them out of increased earnings

Planning for the future is sound policy. But if you still have old-time machines that can't compete with the newer, more efficient equipment, then the future is already here!

Lost profits can't be replaced. But obsolete equipment can—and should be replaced before losses mount higher!

The lack of "normal" cash reserves no longer forces you to wait—to put off until some future date the savings...and earnings...that can start right now. Why not take advantage of Gisholt's Leasing and Extended Payment Plans? Either one will enable you, without tying up important

capital, to put these more efficient producers to work on a "pay-as-they-earn" basis...and give you a running start when you need them most.

More and more forward-looking executives are turning to our leasing and extended payment plans as the best kind of future planning.

Ask for this important bulletin

"What You Should Know About Buying and Leasing Machine Tools" is an authoritative booklet which discusses the facts about depreciation, tax angles and details of this timely subject. Use the coupon to get your free copy.



GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

Gisholt Machine Company

1205 E. Washington Ave., Madison 10, Wisconsin

Without obligation, please send your Bulletin 1173 with details regarding leasing and extended payment plans.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

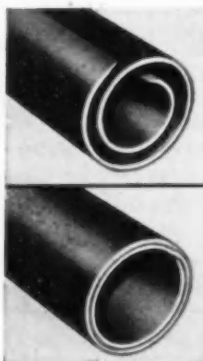
AUTOMOTIVE INDUSTRIES, August 15, 1960

Circle 146 on Inquiry Card for more data

107



There's almost no limit to the things Bundy can mass-fabricate



Bundyweld is the original tubing double-walled from a single copper-plated steel strip, metallurgically bonded through 360° of wall contact for amazing strength, versatility.

Bundyweld is lightweight, uniformly smooth, easily fabricated. It's remarkably resistant to vibration fatigue; has unusually high bursting strength. Sizes up to 3/4" O.D.

Whether it's a complex shape, or just a simple bend, Bundy knows virtually no bounds when it comes to mass-fabricating steel tubing. You see, Bundy engineers are tubing specialists . . . backed by never-ending, ever-bending experience. And here are just a few of the benefits you will derive.

From a single strip of steel comes double-walled, copper-brazed Bundyweld® tubing—leakproof by test—and the tubing standard of the automotive industry. In fact, Bundyweld steel tubing is used in many applications in 95% of today's cars.

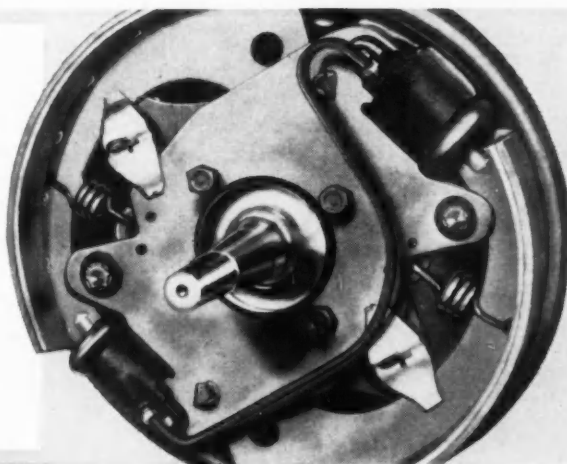
At any stage of product development, Bundy designers can be called in for consultation, and suggestions of time- and money-saving modifications.

For low unit-cost and uniformly high quality, Bundy-designed fixtures and machines are geared to mass-fabricate parts to your specifications. Covered by Government Spec. MIL-T-3520, Type III.

Got a tubing problem? Better see Bundy *first!* Phone, write, or wire Bundy Tubing Company, Detroit 14, Michigan, today.



Another example of Bundy mass-fabrication. This internal hydraulic "snake" replaces mechanical brake linkage; provides safer, surer stopping. Double-walled Bundyweld steel tubing wears indefinitely; with high resistance to vibration fatigue.



There's no substitute for the original

BUNDYWELD® TUBING

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, BRAZIL, ENGLAND, FRANCE, GERMANY, ITALY, JAPAN

BUNDY TUBING COMPANY • DETROIT 14, MICH. • WINCHESTER, KY. • HOMETOWN, PA.

Circle 149 on Inquiry Card for more data



With a 2-segment bucket that can be positioned four ways from the driver's seat, International Drott's "Four-In-One" Skid-Shovel is a bulldozer, scraper, skid-shovel and clamshell.

Construction Equipment Makers Push Versatility, Productivity

**Producers Sharpen Sales Engineering
for Competitive Edge**

By Norman M. Lloyd

MARKETS EDITOR

GETTING the dirt moved is no longer just a matter of brute force and cussedness, . . . no longer a special job to be done in a special way by a special ma-

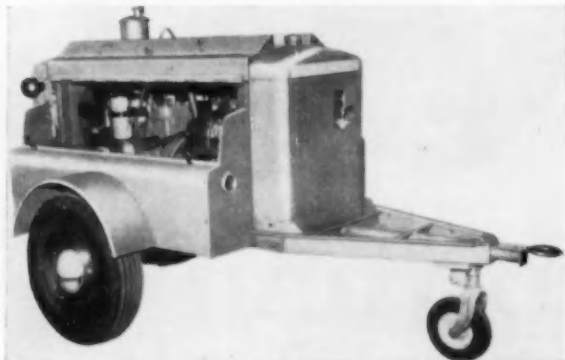
chine, . . . no longer a gamble on the early obsolescence of expensive equipment.

The change has been wrought by a new generation of construction equipment with concepts of design and performance that will (1) do a more efficient job against all odds of increasing costs, (2) extend the life and utility of the tool over a period of years to come, and (3) materially help the user in his determination to get every penny's worth of working time out of his equipment.

The rapid advances in equipment design and construction techniques are partly the result of a continuing assessment by equipment manufacturers of how the machines are being used on the job. Sensitive to the suggestions—sometimes demands of the user—they keep a staff of trained engineers in the field, not only for the purpose of providing "on the house" technical service, but also to keep an eye on how contractors satisfy immediate needs of an immediate job through the use of "hang on" attachments. Many of these are unique, and many never intended nor thought of at the factory. This often becomes the "well-spring" for future factory matched attachments.

Contractors, who continue to face stiff competition (a reported average of seven bidders on federal highway projects), are depending even more on the efficiency and working time of their machines to

Patented "over-under" design is a feature of Worthington's "Blue Brute" portable rotary air compressors. They have first stage compressor located directly over second.



Pettibone Mulliken claims another "first" in motor graders. Model PM-502 uses planetary drive and steer axles.





Brand new all-hydraulic motor scraper by Allis-Chalmers can execute 90 deg turns with one-sixth turn of the steering wheel. Model TS-360 is powered by A-C turbocharged engine developing 340 hp at 2000 rpm.

bring in the job at a profit. The current use and acceptance of "end result" clauses in work specifications is another factor that is changing long-established equipment buying practices. The contractor now has much greater freedom in the selection and use of equipment and methods in completing the job.

The most significant trends, which are continually changing the direction of manufacturing, can be summarized as follows:

Flexibility—The importance of this trend is best emphasized by the great number and variety of matched attachment and convertible tools that are being produced. Manufacturers are off to a running start with the design and development of work packages that enable the user to handle almost every phase of the job with just one basic tool. Prime mover, power-

matched attachments, parts and service are all wrapped up in one "ball of wax."

The advantages are obvious. One basic machine now becomes a com-

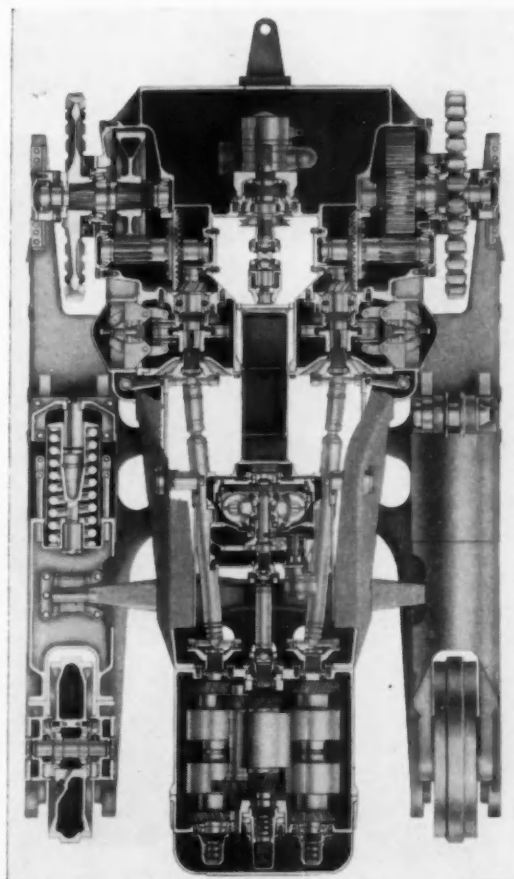
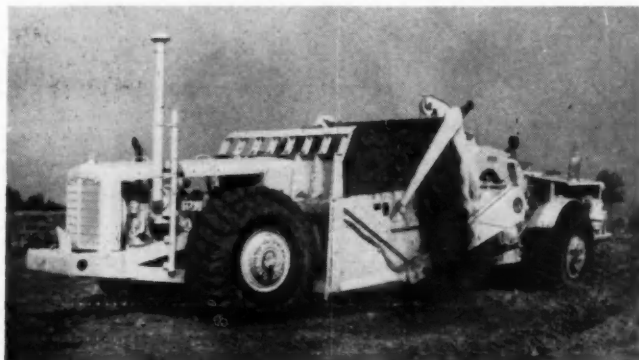
plete construction rig with a long-term lease on the future. With increased power, attachments, power take-offs, mobility and simplified conversion devices, a tractor is now a shovel, a ripper, a trencher, a dozer, a loader, etc. The machine stays on the job!

Power—The torque converter has pushed power ratings beyond what was previously considered the point of diminishing returns. Satisfactory power-to-weight ratios are now possible for large bore, big displacement engines due to the elimination of many drive train components such as clutches and disks. It eliminates lugging and stalling, permitting engines to work at maximum efficiency delivering constant power under heavy loads. Shock loads are virtually eliminated.

Turbocharging is getting a big play due to its capability of packing more power into the engine

Right—Eimco's 103 tractor series has four-speed countershaft transmission coupled with a single-stage torque converter. Constant mesh gears never reverse rotation and eliminate sun and planet gears.

Below—Euclid's TS-14 twin-engine motor scraper. The two power trains are completely independent of each other and major drive components are identical. Capacity 14 cu yd struck.





Seven ft crowd action coupled with free swinging excavator turntable and 2 cu yd bucket are featured on Koehring's new Model 205 "Skooper". Company says 400 tons of loose, stock-piled material was loaded in one hour in time tests.



Torque converter, tail shaft governor and two-speed transmission on Huber-Warco's tandem rollers maintain speed set by operator regardless of grade.



Koehring's 330 "Sprawler" gets its name from pivoting outriggers which can be swung out from the crawler frames.

without increasing bore and stroke. Additional weight of the unit is almost negligible.

Development of gaseous and multi-fuel powerplants are relatively new, but serve to illustrate the continuing emphasis on product design and development.

Although gas turbines are making inroads into commercial markets (aircraft, trucks, pumps and generators), reports from top men in the industry say it is doubtful they will replace conventional powerplants in construction machinery due to the problems of filtered air, high fuel consumption, heat, acceleration, expensive metallurgy, complicated reduction gearing, etc.

Human Engineering—With the growing multiplicity of controls and systems, a growing awareness of the equipment operator and his immediate environment has resulted in a study of man, . . . the factors that contribute to the level of his fatigue, and the resulting degree of efficiency with which his work is performed. Manufacturers studied the size, weight and posture habits of drivers, analyzed the repeated use of the same arm and leg muscles, carried out numerous tests to determine the best location of controls, instruments, lights, etc., and introduced, at least on an optional basis, some sort of cab or protective closure.

Seats and back rests are now padded and adjustable, all controls are grouped carefully, instruments are clustered and illuminated for easy readout, decks are non-slip, fenders (in some cases) are back to shield the operator from dust and dirt, and improved mufflers cut down the noise level.

Hydraulic and electric helper systems now perform a record number of functions. Simple movements of the levers give control of tool movements, draft, depth, angle, etc. Electronic controls have been applied to automatically maintain blade angle on scrapers regardless of the attitude of the machine. Power steering, although not a new development, is no longer the property of the big rigs.

(Turn to page 116, please)

Manufacturers' News

Motor Wheel Buys Foreman

Motor Wheel Corp. has purchased Foreman Mfg. Co., a privately owned Chicago firm. Foreman is a major supplier of undercarriages for mobile homes. It also makes custom-built boat trailers, a complete line of utility trailers and airline cargo trailers. Donald Richards has been named division operating head.

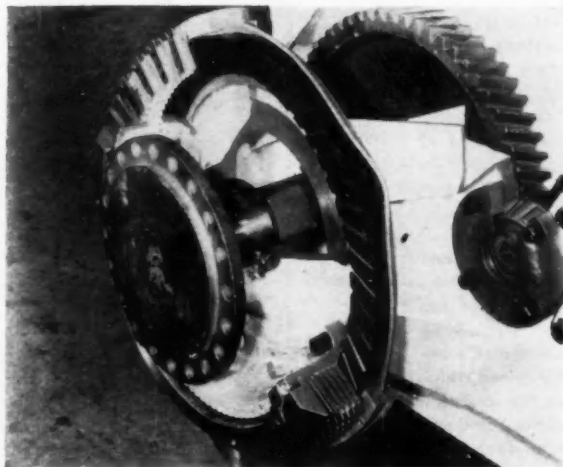
ECA Item Follows Growth Pattern

While military sales declined, sales of Electronics Corp. of America products for industrial use increased 11 per cent in 1959 and accounted for 85 per cent of sales, Arthur G. B. Metcalf, president, reported. Mr. Metcalf said sales of ECA automobile automatic headlight beam changers are following a growth pattern not unusual for new auto accessories offered the public. Volume is slow at the start until the item becomes standard equipment and may be regarded as an essential part of the automobile. In 1959 ECA introduced an automatic headlight beam changer under the trade name "Hi-way-i" for cars already on the road and to supplement Chrysler Corp. requirements for installation on new models. The new automatic headlight dimmer may be readily installed on any automobile having a 12-volt electrical system.

Pyrotex Brake Part Cuts Costs

A molded Pyrotex pressure plate, engineered for brake assemblies used on welded earth-moving equipment, has enabled LeTourneau-Westinghouse Co. to eliminate a costly production machining operation and substantially lower brake component material costs. Pyrotex, an asbestos-reinforced plastic, was used for insulating plates to reduce excessive heat. With heat reduced in brake assemblies, LeTourneau was enabled to continue the use of Buna N composition diaphragms. (Illustrated)

(Turn to page 136, please)



Grooved Pyrotex Pressure Plate Reduces Costs

AUTOMOTIVE INDUSTRIES, August 15, 1960

**FOR CUSTOM
COMPOUNDED
PRECISION
FABRICATED**

Go Goshen RUBBER

**PARTS
SEALS
PRODUCTS**

.....O-RINGS

**TO
MEET
ADVANCED
REQUIREMENTS**

Capitalize on Goshen's experience in serving the needs of hundreds of large and small users of o-rings in the United States and Canada. Precise control of quality thru every stage of formulation and manufacture is the key to an outstanding record of sealing success.

GRC o-rings in all standard AN, MS, SAE and JIC sizes, in many non-standard sizes and in special sizes, are available from established and proven synthetic and silicone specification compounds. Go Goshen for efficient sealing under most any given conditions.





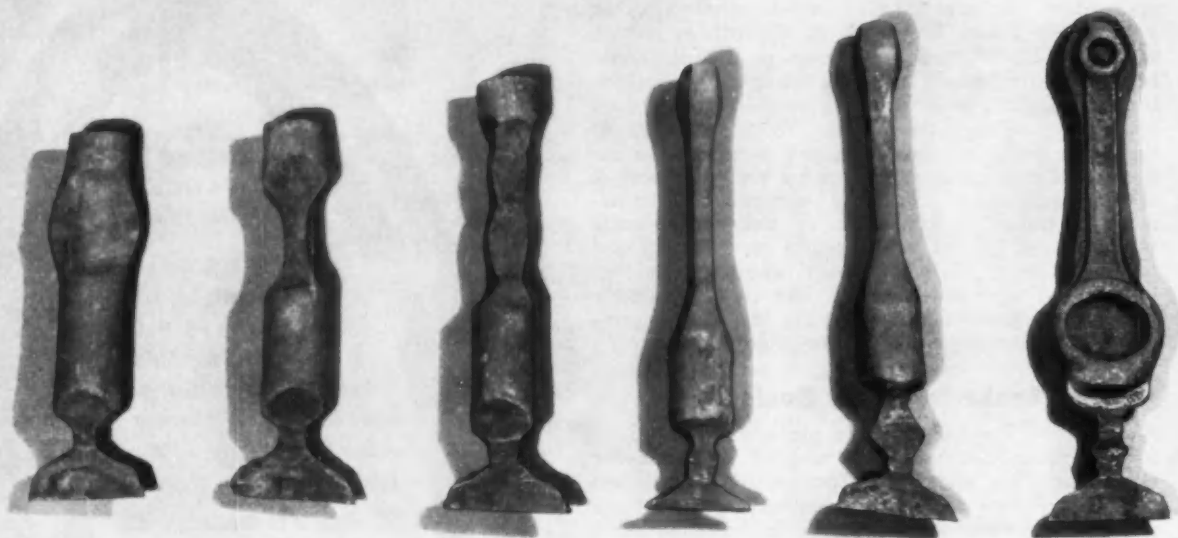
Ask for your free copy of 16-page O-ring Brochure on size, groove dimensions, compounds and other helpful information.

Goshen Rubber Co., INC.

2780 S. TENTH ST. GOSHEN, IND.

Circle 150 on Inquiry Card for more data

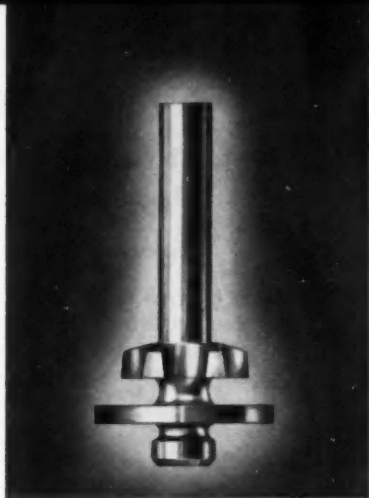
USING REPUBLIC HIGH-PRODUCTION STEELS



TO MINIMIZE HONING: Dynex, Inc., uses Republic ELECTRUNITE® Special Smooth I.D. Hydraulic Cylinder Tubing in their line of single- and double-acting cylinders. The uniform concentricity of this low-cost, welded steel tubing has minimized the need for honing. Delivered to your micro-inch tolerance specifications, ELECTRUNITE is available in a wide range of sizes and wall thicknesses regularly used in hydraulic cylinder applications. Return coupon for data.

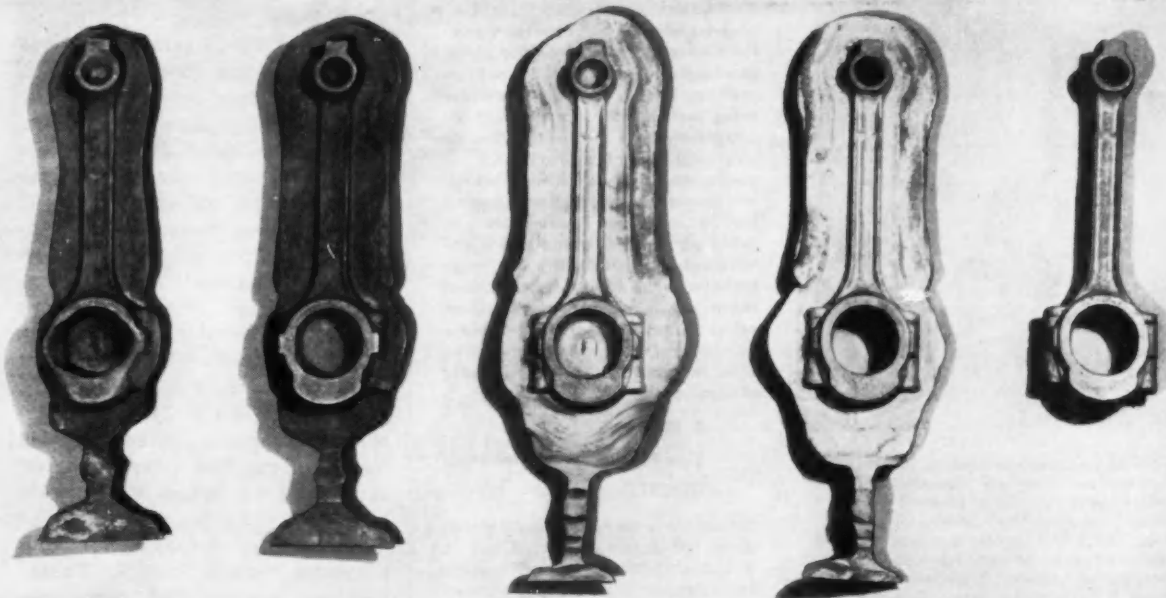
TO MINIMIZE CORROSION: Air Conditioning and Drying Division, Surface Combustion Company, uses Republic Galvannealed Sheets for coil tube sheets in their KATHABAR® humidifying and dehumidifying units. Galvannealed's uniform zinc coating has effectively solved corrosion problems. At the same time, this coating is undamaged by forming operations. You shear, blank, pierce, form, flange, solder, deep draw, or bead with ease. Send for details.





MACHINING ONE-PIECE VALVE STEMS: National Acme Company, Cleveland, Ohio, uses Republic ENDURO® Type 303 Stainless Steel for Hyseal Valve Stems used in new American-Standard single-lever mixing faucets. Valve stems are completed in a single setup. Ten operations including a multiple end drilling of six holes on a 15° angle are performed in 12 seconds. For information on the more than 40 types of stainless steel available from Republic, mail the coupon.

FORGING CONNECTING RODS: Herbrand Division of the Bingham-Herbrand Corporation, Fremont, Ohio, realizes substantial economies through the use of Republic A-8637 Hot Rolled Alloy Steel. Non-varying uniformity permits faster production with fewer rejects. They start with 2½" bars which ultimately undergo 11 forging operations, followed by heat treatment which produces the mechanical properties designed into the forging. Send for details on Republic Alloy Steels.



REPUBLIC 3-DIMENSIONAL METALLURGICAL TEAMS:

Our mill, field, and laboratory metallurgists will help you select, apply, and process the high-production steel best suited to your requirements. Write today or mail the coupon for information on this confidential service.



REPUBLIC STEEL

*World's Widest Range
of Standard Steels and Steel Products*

REPUBLIC STEEL CORPORATION
DEPT. AI-9377-C
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

- ☐ Alloy Steel
- ☐ Stainless Steel
- ☐ ELECTRUNITE Special Smooth I.D. Hydraulic Cylinder Tubing
- ☐ Galvannealed Steel Sheets
- ☐ 3-DIMENSIONAL METALLURGICAL TEAMS

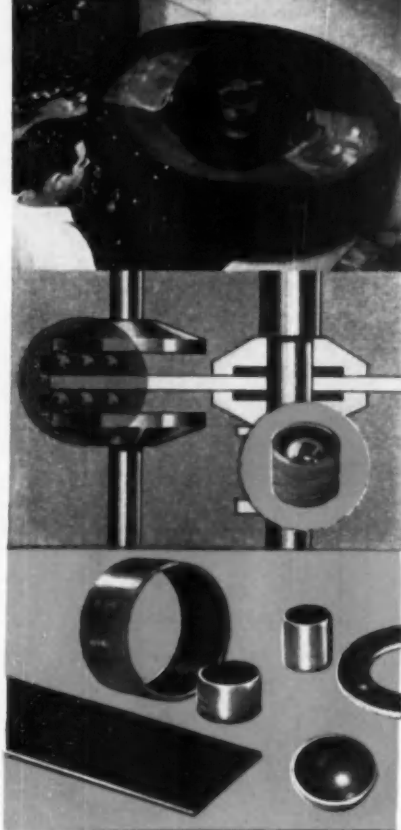
Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

EXAMPLE #3



DU bushings (bottom) partially surround each steel ball in the new "Rouveral" ball-galaxy principle variable speed drive (center), capable of operating up to 8000 rpm. This permits dramatic advance in centrifuge equipment (top) for more accurate missile and aircraft component operational G-force testing. Design illustrates use of DU bushings in lubricated ball bearing where dry operational capability pays off in hard-to-lubricate areas.

DU* DRY BEARINGS

Solve Another Problem

"Our 909 Variable-Speed Transmission is a high-torque, ball-disc friction drive† which utilizes two clusters of steel balls for the transfer elements instead of the more conventional single-ball configuration. Many bearing materials were tested before a satisfactory cluster cage assembly was evolved. The successful design incorporated DU bushings which are partially swaged around each ball for increased bearing area. In addition to an extremely low coefficient of friction, the bushings transfer heat away from critical areas much more efficiently than other materials tested. Problems concerning wear, and tolerance of foreign particles have virtually disappeared."

R. E. Brown

Vice President—Engineering
GENISCO, INC.

DU metal is an ideal bearing material for many applications. It withstands much higher velocities, runs much cooler at lower speeds than other unlubricated bearings . . . has a compressive strength of 51,000 p.s.i. DU metal is applied without the need for temperature-limiting adhesives . . . will withstand from -328°F to $+536^{\circ}\text{F}$.

GARLOCK

Apply DU dry bearings to appliances, automobiles, aircraft, farm and industrial machinery, office equipment. Standard bushings and thrust washers available for $\frac{1}{4}$ " to 2" shafts; strip available for special fabrication. Write for engineering catalog DU-458. Special Products Dept., Garlock Inc., P.O. Box 612, Camden 1, New Jersey.

*Trademark, Glacier Metal Company Ltd.
†Manufactured under license agreement from W.S. Rouveral, University of California at Berkeley



Circle 152 on Inquiry Card for more data

Makers of Construction Equipment Push Productivity

(Continued from page 112)

It is much in evidence on relatively small equipment.

This new breed of equipment reflects the "imaginuity" of both the producers and the users in the design, development and productive application of machines and methods.

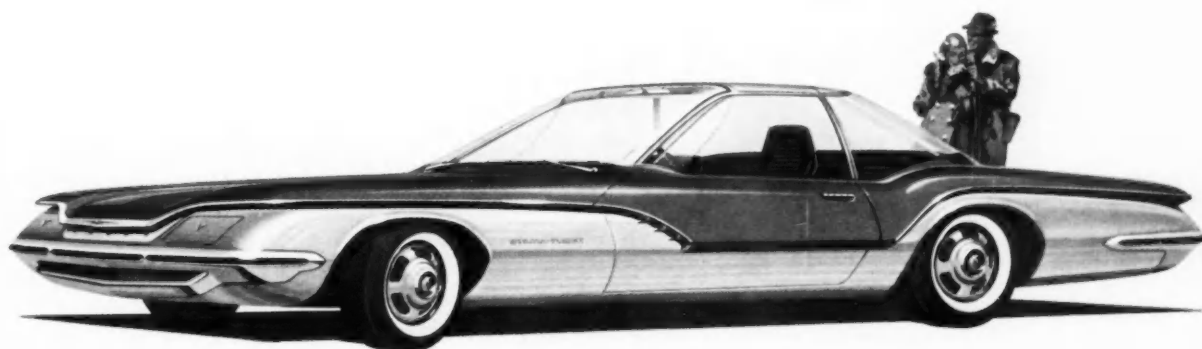
Some noteworthy examples of the trend toward more power, speed, versatility and productivity are:

EUCLID'S TS-14 scraper features two engines, one fore and one aft, driving all four wheels with the weight distributed equally between the two drive axles. The two power trains are completely independent of each other and components of both—engines, transmissions, converters, differentials, drive axles and final reduction, planetary gears—are identical. Dual accelerators enable the operator to use either or both engines. The GM Series 4-71 two-stroke Diesel engines are rated at 148 hp at 2100 rpm. No clutch Torqmatic Drive provides instantaneous full power shifting through four speed ranges and locks-up turbine for direct drive at higher engine speeds (1750 rpm converter output speed). Transmissions are shifted simultaneously by single control. NoSpin differentials increase traction.

INTERNATIONAL HARVESTER — In one attachment, on one machine, the International Drott TD-20 Skid-Shovel gives the user four basic pieces of equipment. Movement of a "machine-selector" lever positions a 2-segment bucket to change the unit into a bulldozer, scraper, skid-shovel or a clamshell. The versatility of the unit is further extended with such Drott attachments as a grubber blade, rock fork, light materials bucket, scarifier, bulldozer blade, bull-angle-dozer, skid-grapple, log-skid grapple and 2-prong pallet fork. A patented "Hydro-Spring," consisting of a heavy-duty hydraulic cylinder enclosed in a heavy duty coil spring, absorbs and cushions impact loads. Dumping can be made

(Turn to page 122, please)

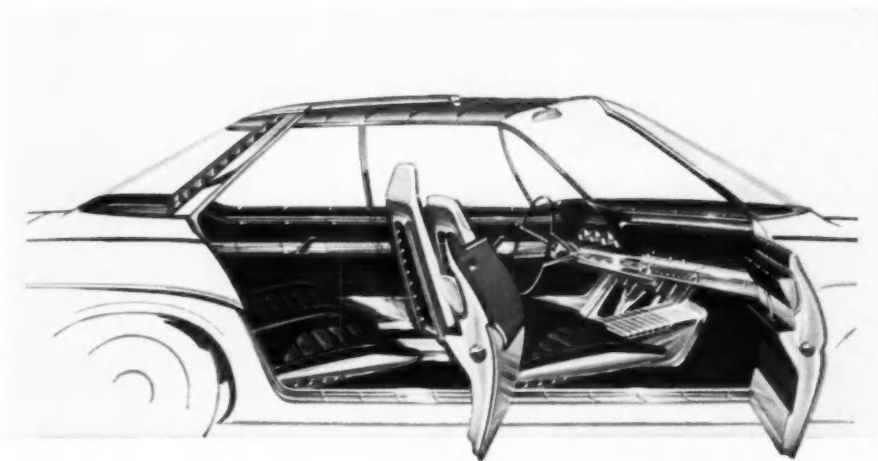
Circle 153 on Inquiry Card for more data —>



stainless steel

No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

**There is nothing
like stainless steel
for AUTOMOBILES**



McLouth Steel Corporation,
Detroit 17, Michigan

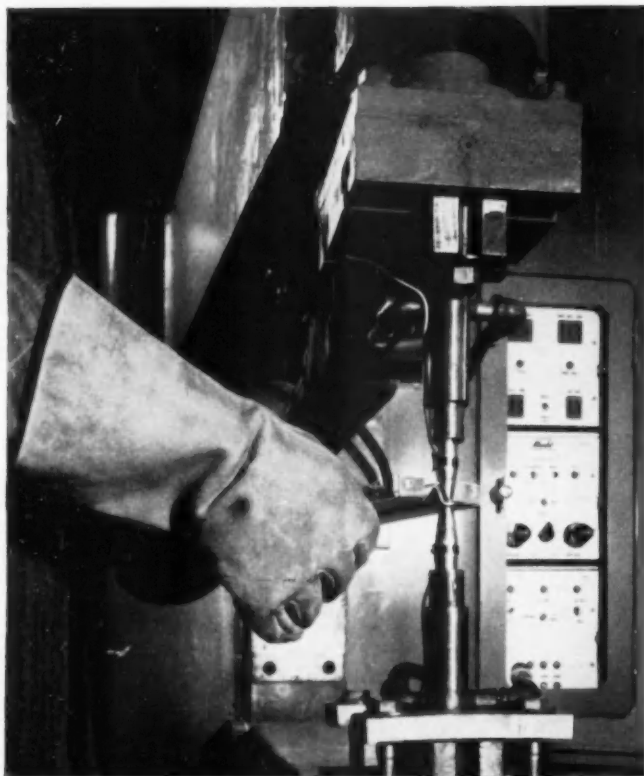
*Manufacturers of high quality
Stainless and Carbon Steels*



Look for the **STEELMARK**
on the products you buy.

McLOUTH STAINLESS STEEL

NEW FEEDBACK CONTROL makes every weld count



Information from electrodes is fed back to **Monautronic V-2** in background. Control has fully automatic sequencing with all provisions for single spot, roll spot and seam welding.



Now, with the new **Monautronic V-2** welding control, you can make consistently top-quality welds over long stretches of time, without stopping to test and inspect sample welds. The control senses variations in line voltage, electrode shape and tip force, material thickness and surface finish . . . and compensates for them immediately.

The **Monautronic V-2** automatically compares actual voltage across the weld with command voltage, and adjusts current accordingly to maintain voltage—and weld quality—at a constant level. If weld resistance is too high or too low to produce a good weld, the control locks out until the condition is corrected.

Although the **Monautronic V-2** embodies the latest advances in computer-type circuitry, it is quite simple to operate, and easier to maintain than most conventional controls. For complete details, contact **THE BUDD COMPANY**, Electronic Controls Section, Philadelphia 32, Pa., or one of our regional offices.

CONVENTIONAL .250 SPACING



1ST WELD

3RD WELD

2ND WELD



MONAUTRONIC .250 SPACING

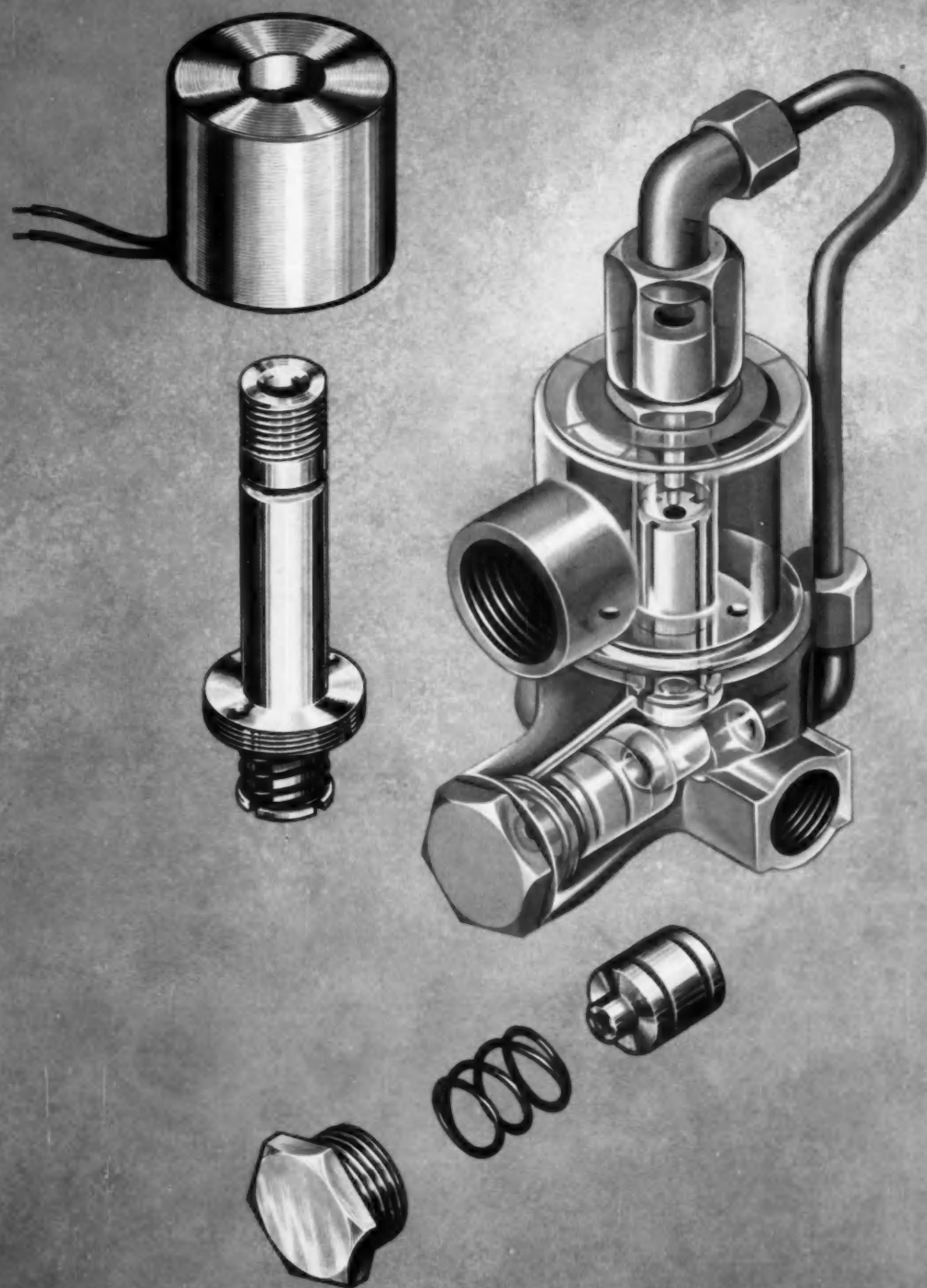
The **Monautronic V-2** overcomes shunting effects by maintaining constant voltage across each weld, regardless of how closely spaced the welds may be. Photomacrographs compare closely spaced welds made with conventional control with those made with **Monautronic V-2**. Notice how shunting of voltage has weakened the center weld made with conventional control, while **Monautronic V-2** has kept all welds uniform.

2450 Hunting Park Ave.
Philadelphia 32, Pa.

12141 Charlevoix Ave.
Detroit 14, Mich.

3050 East 11th St.
Los Angeles 23, Cal.

ELECTRONIC **Budd** CONTROLS

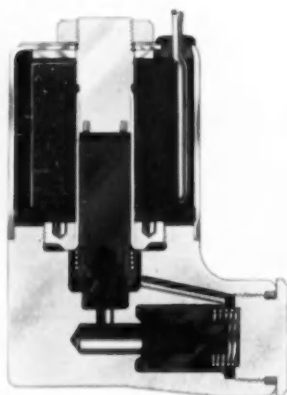
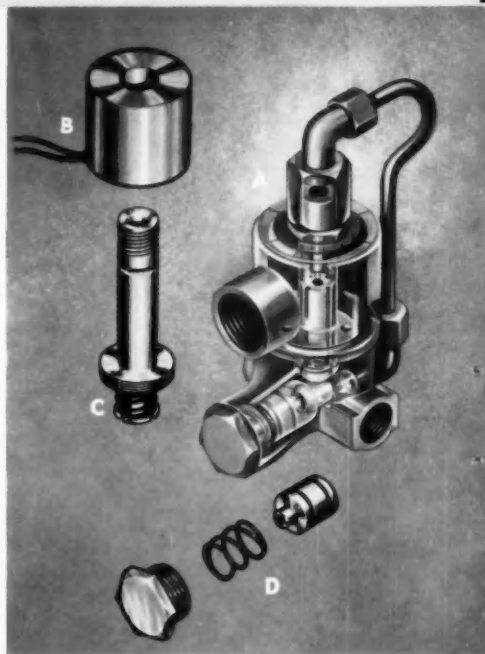


SKINNER 2-way Solenoid Valves
for high flow, high pressure applications

Here's how Skinner two-way valve design provides long lasting, trouble-free operation

- Underwriters' Laboratories approved
- Stainless steel internal parts resist corrosion
- Forged naval brass body
- Famous Skinner V5 solenoid operator
- Well rounded main orifice and pilot seats

A—Transparent view of normally open 2-way R type valve with piped pilot exhaust return
 B—Coil C—Sleeve, plunger and spring assembly
 D—Piston assembly with soft synthetic insert



NORMALLY CLOSED TYPE R2

When you have high-flow control problems at standard or high pressures the new Skinner two-way R series valves may be the answer. These pilot-operated solenoid valves are designed for use with air, oil, water, inert gases and other common media at operating pressure differentials of 5 up to 1250 PSI. They may be used for all types of control applications, such as: in high-pressure lifting, commercial laundry equipment, machinery, machine tooling, spraying, etc.

Skinner R series two-way valves have forged naval brass bodies to provide a dense metal structure and use a foolproof stainless steel piston with soft synthetic insert to open and seal the main orifice. Types are available normally open or normally closed,

in standard and explosion-proof construction.

To make installation easy for every application, a wide choice of electrical housing options is available. These include JIC, AN connector, automotive terminals, etc. All housings can be rotated 360°. Manual override is also offered to permit manual opening of normally closed valves, or closing of normally open valves, in emergency.

Skinner R series valves may be used with all common voltages and frequencies and there are several coil types such as: varnished, molded waterproof, tropicalized and high temperature for specific applications.

The R series, illustrated here, is just one in a complete range of 2-, 3- and 4-way Skinner solenoid valves.

TWO-WAY R SERIES SPECIFICATIONS

Types	R2 XR2	R2H XR2H	R2H6	RP1 XRP1
Position	Normally closed	Normally closed	Normally closed	Normally open
Pipe Size (NPTF Dry Seal)	1/4"	1/4"	1/4"	1/4"
Orifice Size	1/4"	1/4"	1/4"	1/4"
Cv Factor	.758	.758	.758	.758
Operating Pressure Differential (PSI)				
Minimum	5	5	5	5
Maximum AC Service	200	1250	—	150
Maximum DC Service	200	500	1000	150
Leakage	Bubbletight	Bubbletight	Bubbletight	Bubbletight
Temperature Range (Ambient and Media)	Minus 40°F to plus 180°F	Minus 40°F to plus 180°F	Minus 40°F to plus 180°F	Minus 40°F to plus 180°F

When you specify solenoid valves, specify Skinner.

Skinner solenoid valves are distributed nationally.

For complete information, contact a Skinner Distributor listed in the Yellow Pages or write us at the address below.



THE CREST OF QUALITY

SKINNER ELECTRIC VALVES

SKINNER ELECTRIC VALVE DIVISION,
 THE SKINNER CHUCK COMPANY • NEW BRITAIN, CONNECTICUT, U.S.A.

PRINTED IN U.S.A.



Remember when . . .

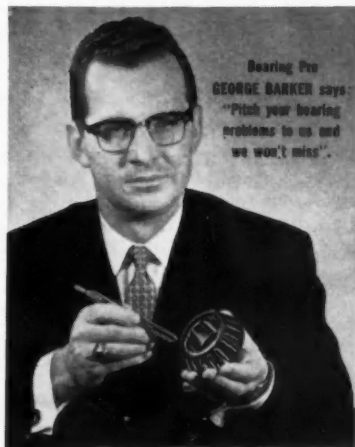
"13" WAS HIS LUCKY NUMBER

It's the crucial point in the 1934 pennant race—the August 14th double header at Yankee Stadium. The Tigers lead by a slim $4\frac{1}{2}$ games. They take the first, 9 to 5. Then Lynwood "Schoolboy" Rowe, aiming for his 13th consecutive win, sews up the race with his 7 to 3 trouncing of the Yankees. That wasn't all. He went on to tie the league record with 16 wins in a row.

That's the kind of skill, determination and experience that marks the pro in any field. The kind that pays off when the chips are down.

Timken Company engineers are the pros in their field. They have over 60 years' experience solving customer bear-

ing problems. They've developed improvements year after year, to pack more capacity into smaller Timken® tapered



roller bearings. Bearings that they produce for less to give you more for your money. And they work right with your engineers to develop bearing mountings that assure your customers trouble-free mileage, cut your warranty and assembly costs.

For the best bearing value, see the bearing pros—Timken Company sales engineers.

The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN®
tapered roller bearings
from the pros of the bearing business

Construction Equipment

(Continued from page 116)

two ways—roll forward or bottom. The factory says that with a 46 degree ground level bucket roll-back and parallelogram raising action, higher heap loads are possible without spillage. Three other models are available in the "Four-In-One" family.

EIMCO reports that its Model

123 front end loader has the largest full dump angle of any front end loader. At full height, the maximum dump angle is 63 degrees. The 123's bucket has a roll back angle of 49 degrees at full height, 53 degrees at half height and 40 degrees at ground level. Two bucket sizes are available, one with SAE rated capacity of 1¾ cu yd and the other at 2¼ cu yd. Maximum breakout force with the bucket heeled on the ground is 25,000 lb. A four-speed counter-

shaft transmission features constant mesh gears that never reverse rotation. This design eliminates sun or planet gears. A single-stage torque converter provides a maximum drawbar pull with sufficient weight of 33,600 lb. The series makes extensive use of steel castings for stress "flow." Unique up-front position of operator puts him directly over work with unobstructed view of terrain.

KOEHRING's new "Skooper" has 7 ft crowd action coupled with free swinging excavator turntable. The 2 cu yd bucket can dig, swing and load without track movement. Company reports that in timed tests, the "Skooper" has loaded loose, stock-piled material at the rate of 400 tons per hour. Due to the elimination of "shuttle-loading," only a 64 hp Diesel engine is used. With removal of the entire front end, conversion to a lift crane, dragline, hoe, clamshell or shovel can be accomplished.

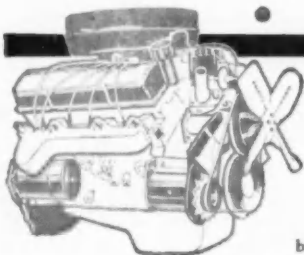
For heavy construction, the company produces a crane dubbed the "Sprawler" 330. It gets its name from pivoting outriggers that are attached to the crawler frames. With outriggers extended, Koehring says the "Sprawler" will lift 60,000 lb, or 11 per cent more than its working weight. With outriggers retracted, it will "walk" with 47,980 lb load.

PETTIBONE MULLIKEN has claimed another first (torque converter and power shift transmission) in motor grader design with the use of planetary drive and steer axles on its PM-502 "Speedmatic," making the machine a four-wheel drive, four-wheel steer grade. The model also features hydraulic brakes at each wheel, and hydraulic power for all grading operations.

ALLIS-CHALMERS has introduced a new all-hydraulic TS-360 motor scraper with a 30 cu yd heaped capacity and a 22.3 struck. The unit is powered by the A-C turbo-charged 21000 engine developing 340 hp at 2000 rpm. Double-acting steering jacks and multiplier links make it possible to execute a full 180 degree turn in a radius of 35 ft 8 in. A "Kon-Tork" differential of only five moving parts provides maximum traction in all types of terrain. Attention to human engi-

(Turn to page 140, please)

JOHNSON tappets



**for all engine applications*

All of the engineering and manufacturing effort at Johnson Products goes into producing a better tappet. Continual experimentation and exacting quality control make JOHNSON TAPPETS worthy of your consideration. Only proven materials, covering a range of hardenable iron, steel, and chilled iron of various alloys, are used in JOHNSON TAPPETS. These tappets are successfully used in jobs ranging from light duty to the most severe, punishing applications. Serving all industry that employs internal combustion and diesel engines.



"tappets are our business"

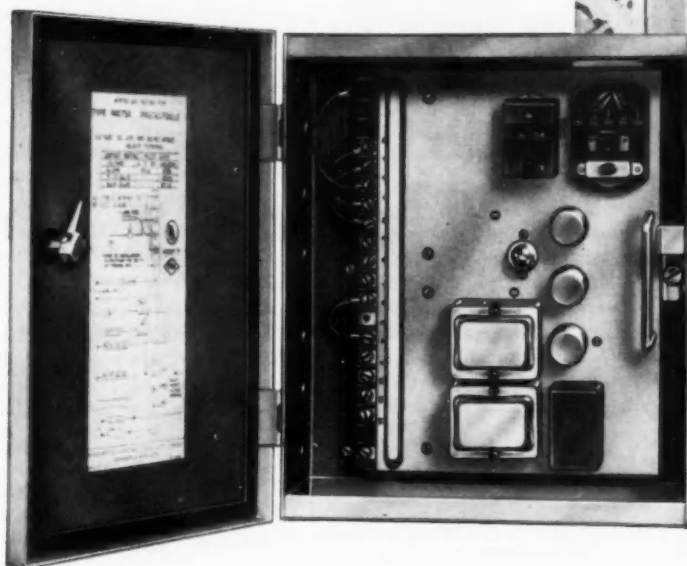
JOHNSON *JP* PRODUCTS

MUSKEGON, inc. MICHIGAN

from Honeywell...  ANOTHER DIAMOND JUBILEE PRODUCT

Honeywell is first with the only fail-safe flame safeguard!

New maximum-safety, self-checking relay
prevents losses due to burner safeguard
failure and resulting explosions.



The Honeywell Protectoglo* Relay offers you the most fail-safe protection yet devised for industrial burner safeguards—truly an important break-through in the art of flame safeguarding! Never before has a flame safeguard offered you such low-cost assurance against explosions and downtime. Compared to the Honeywell R4075, all other continuous process flame safeguards are obsolete!

In other flame safeguards, safe-start, self-checking networks operate *only during start up or recycling*. The new R4075 unit operates constantly. It will cause an immediate safety shutdown and sound an alarm if the sensing

*Trademark

signal, amplifier or related circuitry fails *at any time* while the burners are operating or during start ups or shut-downs. This same self-checking circuit checks all components of the Protectoglo system including the flame rod once *every second*. You get maximum protection, not only on safeguard systems for constantly burning gas burners using flame rods, but also on gas- or oil-fired systems using Ultra-Vision flame detectors. For information on how the Honeywell R4075 can help your industry, call your nearest Honeywell office; or write: Minneapolis-Honeywell, Dept. AI-8-30, Minneapolis 8, Minnesota.

Honeywell

75th
PIONEERING THE FUTURE
YEAR



First in Control
SINCE 1885

MACHINES ON THE MOVE...



—equipped with **FAIRFIELD GEARS**



GEARS to match the speed, size, and power of modern machines are a Fairfield specialty. This is possible because Fairfield is a leader in utilizing the most advanced methods, machines, and techniques for producing better gears. By specializing exclusively in "Fine Gears Made to Order", Fairfield has become one of America's largest independent producers of these parts.

If you use gears in the product you make, we believe it will pay you, as it has others, to become acquainted with FAIRFIELD—the place where fine gears are produced to meet your specifications **EFFICIENTLY, ECONOMICALLY!** Fairfield's production facilities are unexcelled. *Call or Write.*

FAIRFIELD MANUFACTURING CO., INC.

2303 South Concord Road • Lafayette, Indiana
TELEPHONE: 2-7353

A "PLUS VALUE" IN ANY PRODUCT



Gears and Differentials



Made to Order for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

Marine Engine Manufacturers Report Rise in Sales

(Continued from page 71)

sales picture for the current model year through May."

Fred Alter, Dearborn Marine Engines, Inc.—"With increased interest in leisure-time boating, the enthusiasts' activities are no longer centered around the established yachting areas. Instead, the advent of the boat trailer has allowed them to pursue their recreation in remotely located areas, and around the growing number of artificial lakes and reservoirs. One of the main requisites for this portability is light engine weight. However, the demand for more power to push these larger boats and pull water skiers has caused the outboard motor to grow in weight and bulk until now it can certainly no longer be referred to as portable.

"Therefore, there has developed within the boating industry a tremendous amount of interest in the inboard-outboard or transom drive type of propulsion. We at Dearborn Marine Engines feel that our next large area for expansion may be in this field.

"We expect a great deal of activity in this direction from not only other inboard engine builders, but from the outboard industry as well.

"Increased volume has allowed Dearborn to begin use of permanent mold castings for oil pans, front covers, and bell housings."

Production Facilities

In response to inquiries about recent plant additions or new manufacturing techniques, the following comments were made:

R. C. Bolling, president, Palmer Engine Co.—"A few new machines, and a 12,000-sq-ft storage building. We have streamlined our assembly process so engines can be handled on overhead track."

G. L. Bego, director of sales services, Cummins Engine Co., Inc.—"About 300,000 sq ft was added to manufacturing space at a cost of \$6.5 million, for production, test

SAFE EMERGENCY STOPS...



WITH **Wagner® Lockheed** **MANUAL AND FULLY AUTOMATIC** **TRACTOR-TRAILER PROTECTION VALVES**



**WAGNER
EMERGENCY
BRAKE VALVE**
provides "push-pull"
manual control to
activate the tractor's
emergency protection
system and to trigger
emergency braking
on the trailer.

WAGNER TRAILER RELAY EMERGENCY VALVE

fully applies the trailer
brakes when the emer-
gency brake valve is
actuated manually by
the driver, or automati-
cally if the tractor system
pressure drops to an
unsafe value.



WAGNER TRACTOR AIR LINE PROTECTION VALVE

automatically isolates
the tractor air supply by
sealing the service and
emergency air lines if
the trailer is uncoupled,
breaks away or loses its
air supply. It also auto-
matically activates trailer
emergency valve to
apply trailer brakes
if tractor system pres-
sure drops to an unsafe
value.



Braking emergencies are something truckers have to live with. But, they can live with them a lot more safely if you equip the vehicles you make with Wagner Lockheed Emergency Brake Valves and Tractor Air Line Protection Valves. These valves, when used with the Wagner Trailer Relay Emergency Valve, give drivers of your vehicles safe emergency braking.

Wagner builds components for *all* braking systems—air or hydraulic; everything from the actuating system to the foundation brakes. REMEMBER, when you equip the vehicles you manufacture with Wagner Lockheed Emergency Brake Valves and Tractor Air Line Protection Valves, you add safety and low-maintenance features that build customer acceptance.

CONSULT YOUR WAGNER AIR BRAKE SPECIALIST



Let him help you with your specifications, and also ask him about the engineering consulting service available from Wagner.

Wagner Electric Corporation

6363 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI



LOCKHEED BRAKE PARTS, FLUID, BRAKE LINING and LINED BRAKE SHOES • AIR HORNS • AIR BRAKES • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES

AUTOMOTIVE INDUSTRIES, August 15, 1960

Circle 160 on Inquiry Card for more data

125



YODER ROTARY SLITTERS

If your slitting requirements call for coil widths from 12" to 60", in gauges from .015" to .250", the economy of purchasing Yoder Slitting Machinery can be yours. Operating a Yoder Slitting Line only one eight-hour shift per week, for example, could easily produce 35 tons of slit strands per week... or 1,820 tons every 52 weeks. At a slitting cost saving of only 1/2¢ per pound, the annual savings would amount to \$18,200.

Additional savings can be realized through lowered inventory of mill-width coils—less waiting for delivery of special slit widths. Also, customer satisfaction will increase as you achieve faster completion and delivery of finished products.

At your request a Yoder sales engineer will study your plant operation to determine what equipment would most economically... and profitably... serve you, whether it be standard components or a completely specialized and engineered line.

Send for Yoder's illustrated text on slitting operations and equipment. It describes methods, time studies, operating cycles, material handling, and gives full specifications.

THE YODER COMPANY
5553 Walworth Avenue • Cleveland 2, Ohio



Circle 161 on Inquiry Card for more data

and shipping. A new building has been started for engine assembly."

H. H. Weiss, marine engine sales manager, Allis-Chalmers Mfg. Co.—"A new \$20 million addition was made to our production facilities at Harvey, Ill."

Fred Alter, Dearborn Marine Engines, Inc.—"Plant capacity was doubled May 1, 1960. During expansion, improved painting facilities and expanded test stands with cooling towers were installed. A very complete and separate quality control department has con-

tributed to the improvement of our products."

Export Market

While the subject of the export market for U. S. marine engines was not part of the AI survey, it will be of interest to note here that 1959 export sales amounted to \$25 million and 55,351 engines. Breakdowns by types of engines with their corresponding values are contained in the accompanying table.

Imports of marine engines during 1959 totaled \$1,386,925.

New High-Speed Hydrofoil Boat Employs Gas Turbine Power



Artist's conception of gas-turbine-powered hydrofoil boat being built by Grumman

Gas turbines for both propulsion and accessory power requirements will be employed on a novel hydrofoil boat now in process of construction.

The 104-ft-long craft, with a top design speed of 80 knots, is being built for the U. S. Maritime Administration by Grumman Aircraft's Dynamic Developments Div. It is scheduled for launching next spring.

The 80-ton all-aluminum boat has a set of foils just forward of the craft's center of gravity which will support the boat hull above the water at high operational speeds. Smaller foils, located well aft, are being used to provide stability and high-speed maneuverability.

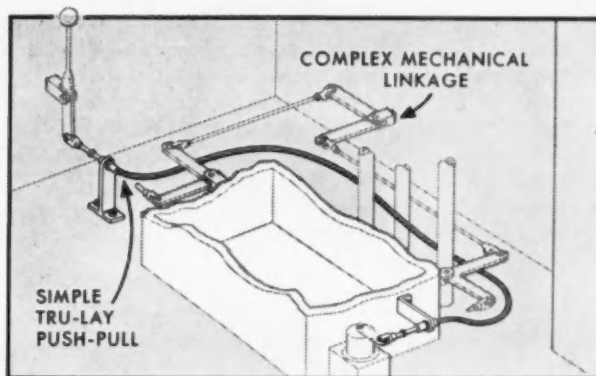
The boat will have two gas turbine prime movers. When operating

on the hull, propulsion will be supplied by a General Electric T-58 turbo-shaft engine, which has a max rating of 1050 prop shaft hp at 19,500 rpm. When the boat is on the foils, propulsion is to be furnished by a G.E. J-79 turbo-jet engine, which has a rating of 15,000 lb thrust.

The Garrett Corporation's AiResearch Mfg. Div. is another major contributor to this development. Two AiResearch 85-91 GTCP (gas turbine compressor and power) units of 200 shp will pneumatically start the J-79 turbo-jet and will also power electric generators. Starting will be by bleed air from the small gas turbines. Each will additionally drive an aircraft type alternator to supply 65 kw of 400-cycle power for filling the electrical needs of the boat. ■

TRU-LAY **PUSH-PULL** CONTROLS PROVIDE ACCURATE, DEPENDABLE REMOTE CONTROL FOR HUNDREDS OF PRODUCTS

• If your products involve remote control—electrical, hydraulic, pneumatic or direct—TRU-LAY PUSH-PULL FLEXIBLE CONTROLS can help solve your design problems. They provide positive remote control over long or short distances—up to 150 feet from the control point. Because they operate while flexing, they can snake around obstructions. They will not buckle. They are ruggedly constructed, easily installed and operated, sealed against dirt and moisture, and will handle jobs with as much as 1,000 lbs. input. PUSH-PULL CONTROLS are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Mechanical linkages, on the other hand, are complex. Unlike PUSH-PULL CONTROLS, they are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Sizes and Operating Heads to Fit Your Design

Control Dimension	Minimum Recommended Radius in Inches	Maximum Input Load in Pounds (Dependent on Travel)
$\frac{3}{32}$ "	2	30
$\frac{1}{8}$ "	3	65-125
$\frac{3}{16}$ "	5	115-175
$\frac{1}{4}$ "	6	300-600
$\frac{5}{16}$ "	8	700-1,000



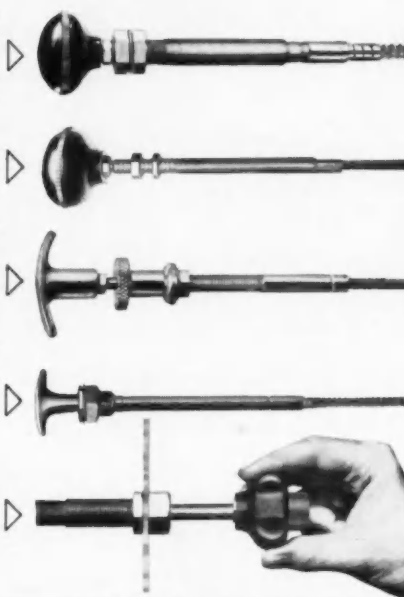
Heavy Duty • For use where rugged duty prevails, but where operation must be smooth and accurate. Meets all requirements for dependability and life.

Light Duty • Gives smooth, accurate and dependable performance at low cost. Available with your choice of several types of knobs.

Selective Friction • Amount of friction can be changed to meet individual requirements of the operator or application. Friction constant at any setting.

Position Lock • A slight turn of the T-type handle locks the control in any position. Available in two sizes for light and heavy-duty applications.

Micro Control • Push or pull the knob for instantaneous response, then rotate knob for vernier adjustment. Built for smooth, efficient operation on any job.



PUSH-PULL DATA FILE shows how to simplify, improve design

PUSH-PULL CONTROLS are solid as a rod and flexible as a wire rope. They're factory-lubricated for life, unaffected by temperature extremes, and can be adapted to practically any application. For complete details on how you can use them, write for the PUSH-PULL DATA FILE. It contains 7 engineering Bulletins which describe in detail the operation of PUSH-PULL CONTROLS, their applications, features and advantages. Our engineers will be glad to help you make TRU-LAY PUSH-PULL CONTROLS a part of your product.

PUSH-PULL CONTROLS

Automotive and Aircraft Division • American Chain & Cable Company, Inc.

601-H Stephenson Bldg., Detroit 2

6800-H East Acco Street, Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.



Silencing Techniques at Rover Plant

(Continued from page 106)

periodic chassis lubrication required is confined to four points on the propellor shaft at 3000-mile intervals.

A two-piece propellor shaft is used, and the center universal joint is supported by a complex rubber-mounted bracket to prevent trans-

mission of bearing whine to the body floor. The bearing housing is fixed to an elliptical carrier attached to the supporting bracket by a pair of soft rubber cushions, while a coil spring between the two counter-balances the static weight of the shaft. The under-bracket is then attached to the sides of the widened walls of the floor tunnel by four rubber mounts.

With all these components in place on the final assembly line, the partially trimmed body is dropped

onto the six sub-frame points and the springs. Since the leaf springs' rear mounts do not have the swing of an ordinary pivoted shackle, their ends are initially hooked to an underslung beam with a hydraulic jack in the center. As the body is lowered the jack is manually extended to deflect and therefore lengthen the springs so that the angled bolts on the rubber cushions are aligned with the slotted holes in the mounting bracket. The weight of the hull then deflects the spring, and the beam is released and withdrawn.

The problem of silencing is approached methodically elsewhere on the car. For example, the exhaust system includes a three-part resonance chamber whose steel outer shell is wrapped in asbestos to reduce case noise. This is followed by an absorption muffler packed with glass wool.

The tailpipe clamp is supported by a rubber-bushed bolt which in turn is suspended by a flexible strip on the mounting fixture. The first bend in the exhaust pipe after the manifold is rigidly clamped to the clutch housing to eliminate a mysterious howl thought to have been excited by the adjacent camshaft.

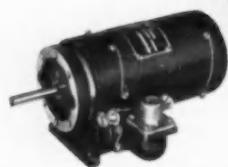
In addition to an oil-bath air cleaner there is a separate resonance chamber silencer. Air is then piped to the carburetor intake through a duct formed by a complex one-piece alloy casting.

Throttle shafts and links are carried in molded nylon bushings with the support brackets attached to the body through rubber grommets. This arrangement eliminates rattles and transmission of engine noise as well as easing alignment of the linkage. Electric fuel pump, windshield wiper motor and ventilator blower are also flexibly mounted.

On the body itself, trimmed on a line paralleling the assembly track, is lavished no less than 185 lb of sound-deadening material. Floor pan and wheel arches are under-sealed, and the interior including door panels is sprayed with a water-based bituminous compound, while both sides of the critical front bulkhead are similarly coated.

Transmission and rear wheel intrusions are covered with bituminous sheeting, and the entire floor

AVENUE TO THE RIGHT MOTOR...

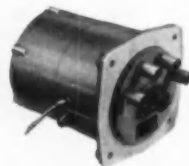


Totally enclosed fan-cooled 27 Volt DC motor for pump drive. Frame 2 x 1½

24 Volt DC single stage gearmotor with radio interference suppression filter for heavy duty oil transfer pump. Frame 5 x 1½



12 Volt DC split series motor for operating landing gear on commercial airplanes. Frame 2¼ x 1¼



Four-pole 400 Cycle AC motor incorporating two-stage centrifugal blower with multiple air outlets. Frame 2¼ x 1

A design that meets your exact motor requirements

Into the design of a Lamb® motor goes our 45 years of specialized experience in powering aircraft components, industrial, commercial and domestic products.

Out of the design comes a motor having the dependability and smooth, efficient operation required for the exceptional performance of your product.

These advantages are standard with Lamb motors . . . engineered to your exact requirements . . . mass produced to obtain most favorable cost. Descriptive folder sent on request.

THE LAMB ELECTRIC COMPANY KENT, OHIO

A Division of American Machine and Metals, Inc.
In Canada: Lamb Electric
Division of Sangamo Company Ltd. — Leaside, Ontario

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER MOTORS

Divisions of American Machine and Metals, Inc., New York 7, New York TROY LAUNDRY MACHINERY • RIEHLE TESTING MACHINES • DE BOTHEZAT FANS • TOLHURST CENTRIFUGALS • FILTRATION ENGINEERS • FILTRATION FABRICS • NIAGARA FILTERS • UNITED STATES GAUGE • RAHM INSTRUMENTS • LAMB ELECTRIC CO. • HUNTER SPRING CO. • GLASER-STEERS CORP.



SOLVING MATERIAL DESIGN PROBLEMS QUIET OPERATION

Timing gears made of CDF Celoron will not pick up and amplify sound due to Celoron's naturally low tone frequency. Tests show that Celoron gears reduce noise by up to 50% compared to all-metal gear sets!

Made of quality controlled, fabric reinforced phenolic resin, Celoron® high-impact gears are constantly replacing metal in critical areas ranging from earth-moving machinery to compact cars to movie projectors.

Celoron molded materials are only one family of products from industry's largest selection of

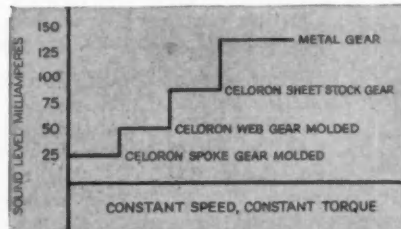
non-metallic structural and electrical materials ... including thermosetting laminates, vulcanized fibre, silicone rubber, and mica.

This wide choice gives you every assurance of meeting your exact quality and cost needs in plastic material. Refer to Sweets PD file or write to us for the latest Celoron catalog.

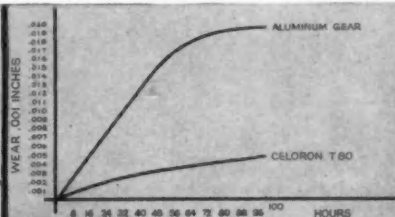


CONTINENTAL-DIAMOND FIBRE

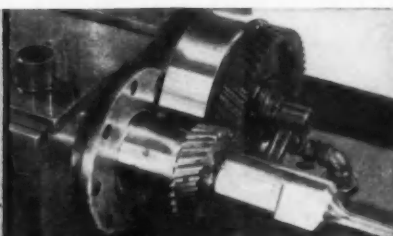
A SUBSIDIARY OF THE ~~Buhl~~ COMPANY • NEWARK 2, DEL.
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Low sound level of Celoron is shown by this graph which compares metal to the different types of Celoron gears.



Long wearing characteristics of Celoron gears are here contrasted to the shorter life spans of metal-made gears.



Quality control of Celoron gears is assured by special testing machines such as this in CDF laboratories.

area with a double underlay having similar sheeting sandwiched between two layers of felt. Felt-backed pile carpets give a total floor padding of $\frac{3}{4}$ in.

Under the hood is a fiberglass panel in a cotton bag retained by wire netting, and the roof is lined with brown felt. For silencing as well as for aesthetic reasons the body interior is trimmed with wood or leather so that there are no exposed metal surfaces.

In the detail design of the body, wind noise was tackled by avoiding external projections around the windows and doors, and by minimizing or sealing up recesses, such as the narrow gaps between the glass channels and window openings, which are closed by a chrome plated U-section strip. For this reason the front windows do not have hinged vent panels, although these may be introduced later because of styling requirements. ■

Induction Hardening Axle Shafts

(Continued from page 79)

operative work the Westinghouse Electric Co. succeeded in adapting their horizontal induction heating unit to incorporate a system of roller steady rests to control distortion. As illustrated, a series of three roller steady rests are adjusted automatically to the mean diameter of the shaft with a hydraulic pressure of 450-psi at each point.

Fort Wayne Works has installed

four of these Westinghouse induction machines, as illustrated. They are served by two 300-KW, 3000-cycle generators, supplying approximately 75-KW at each induction coil. The automatic loader holds six shafts, placing two at a time on the feed beam, the latter indexing the two shafts to a position below the two spindles of the machine.

The roller steady rests now raise

the shafts into position for chucking and centering, then retract. The shaft is centered automatically at the spline end, while the flange is centered in a rotating chuck with pressure applied to force the flange face to the ID of the chuck face.

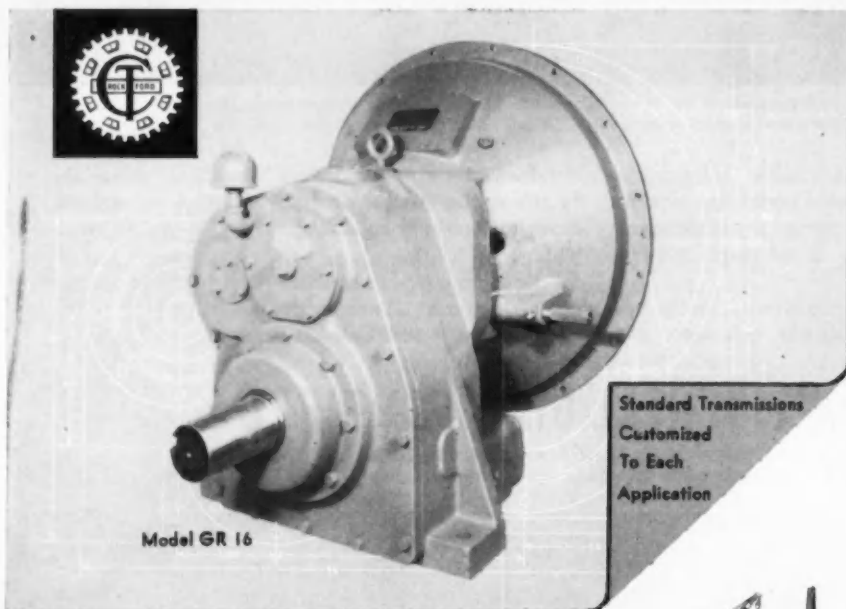
At this stage the top carriage moves the inductor coil from the spline end center to the face of the flange. The steady rests automatically adjust to the mean diameter of the shaft, the shaft begins to rotate, and heat and quench cycles come into action as the induction coil traverses from the flange to the spline end. During this cycle, as the inductor ring approaches each set of rests, the rest automatically retracts to allow passage of the coil.

Following scanning of the entire length of the shaft, the induction coil retracts beyond the spline end center, the flange is released, and shaft is lowered to the feed beam for automatic unloading.

Quenching is done with a 10-per cent soluble oil solution applied under pressure through the induction

(Turn to page 141, please)

Solve your heavy-duty power problems with Cotta heavy-duty transmissions!



Is full engine power out of reach because your gearbox can't handle the heavy-duty loads? Cotta power transmission specialists can customize standard transmissions to meet your individual heavy machinery requirements: multi-speed, forward and reverse, space limitations, continuous day and night operation, weight, mounting, and other special needs for your own exact applications.

Cotta takes over where standard transmissions and gearboxes quit, in capacities from 150 to 2500 ft-lb input torque. For half a century Cotta has built precision transmissions for power shovels, locomotives, drilling rigs, rock crushers, pumps, and generators.

See our catalog in *Sweet's Product Design File*. Check the detailed descriptions on standard and custom applications. Then call Cotta (TWX-RK 7720 or phone WO 4-5671) for transmissions that withstand vibration and shock loads on the toughest construction, mining, and industrial jobs.

COTTA



Pumping Locomotives Construction Drilling

HEAVY-DUTY TRANSMISSIONS

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

**Whatever
the
condition...**



Polyken Polyethylene Tape #822 insulates outside radio antenna on high-altitude planes, stays flexible in severest cold.

**the
climate...**



"Big Inch" pipeline wrapped in Polyken Protective Coating Tape withstands 120° heat of Iranian desert, resists corrosion.

the job...

INSULATING • SEALING • WATERPROOFING • BINDING
PROTECTING • PACKAGING • REINFORCING • MASKING
HOLDING • BONDING • SPLICING • HEAT-SEALING

There's a Polyken Tape to solve your problem

A jet slices through the thin stratospheric air in -70° F. cold. A pipeline carries precious oil across miles of desert waste under a broiling sun. Both do their jobs helped by modern Polyken tapes.

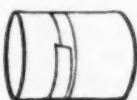
Within this complete and versatile line are tapes that can solve your particular problem regardless of climatic extremes of temperature and humidity,

under severe conditions of stress and corrosion. Tapes designed for dozens of uses in thousands of areas of production, packaging, and shipping. For the tape-answers to *your* needs, phone your nearest Polyken Industrial Tape Distributor. Or write to Polyken Sales Division, Dept. AI-8, 309 W. Jackson Blvd., Chicago 6, Illinois.

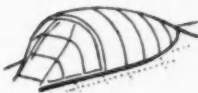
Three of a Thousand Ways Polyken Can Work for You:



Polyken Fiberglass Tape effectively seals heating duct joints despite constant high temperatures.



Polyken Waterproof Packaging Tape protects drums of costly pharmaceuticals from water, air, dust.

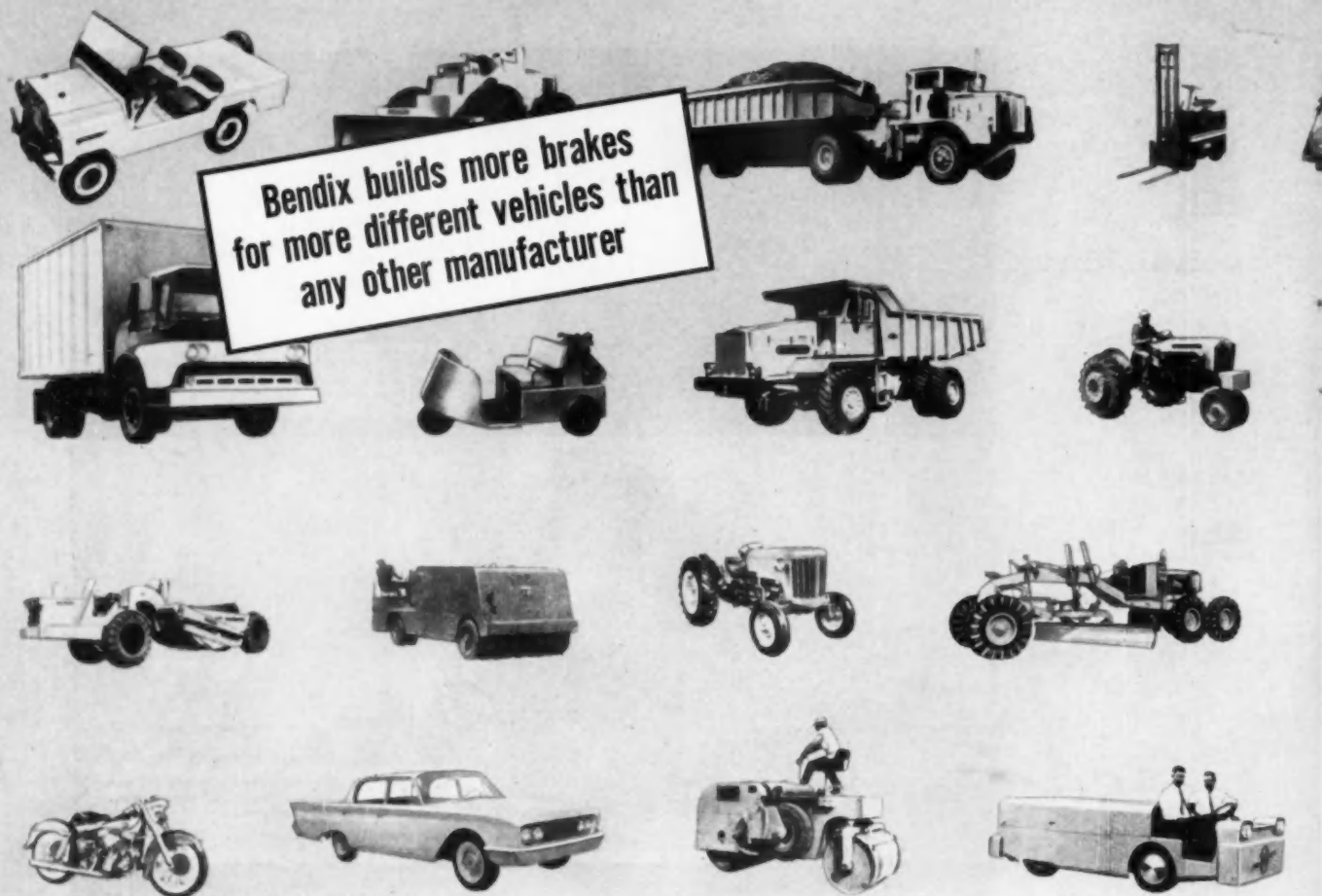


Polyken Surface Protection Tape guards "soft" plexiglass cockpit canopy, yet comes off clean and easy.

Polyken®

INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division



No matter how special your needs...

IT PAYS TO PUT YOUR BRAKING

If you are faced with brake design or supply problems, the following answers to important questions will bring out some facts you should know about Bendix®—and how we can help you.

Q. Why go to Bendix for help with braking problems?

A. Bendix is the world's largest brake manufacturer, with a total lifetime production of over 141 million units. During our 40 years' experience, more people have turned to us for braking help than to any other company. That's why you can feel confident in going to Bendix for help with your braking problems.

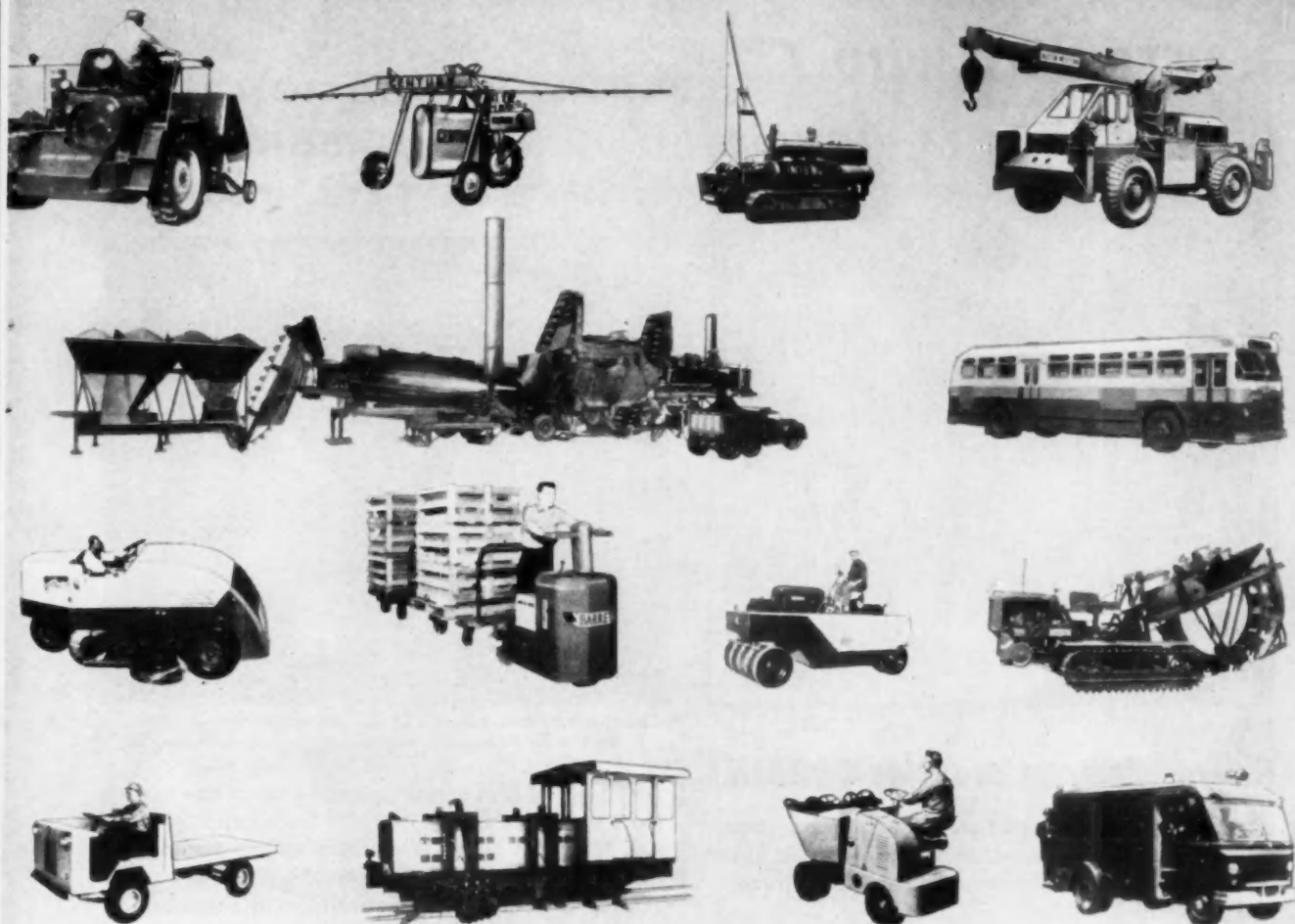
Q. What kinds of vehicles use Bendix brakes?

A. Bendix brakes are on vehicles of all kinds: passenger cars, trucks, buses, motorcycles, golf cars, tractors and farm machinery, mine cars, rail cars, ordnance vehicles, trailers, sweepers, rollers, motorized plant dollies, fork lifts, construction equipment. In addition, Bendix brakes are used on many kinds of machine tools and

other industrial equipment. This all-around experience can help solve your braking problems.

Q. What specific advantage does Bendix offer in solving automotive braking problems?

A. Bendix is unmatched in automotive brake engineering experience. Our current production schedules include more than 400 different types of automotive brakes alone. Many of these systems are highly specialized. Answers to your braking needs may be found among the types we are already producing. But, no matter how "different" your problem may be, Bendix has the experience and facilities to help you solve it.



PROBLEMS UP TO BENDIX!

Q. What is Bendix' record in brake research and development?

A. Bendix has pioneered many of the major advancements in braking. These include four-wheel brakes, Duo-Servo[®] braking, automatic brake adjusters and the most modern development of all—power braking. Most braking systems in use today are patterned after original Bendix designs. Meeting the challenge of "newness" is a Bendix specialty that will go to work on your braking problems.

Q. What does Bendix do to test and prove brakes?

A. Bendix conducts more brake pre-testing than anyone else in the world. First, the materials and designs are "torture-tested" in the world's most modern,

completely equipped brake laboratory. Then, the brakes are given exhaustive, on-the-road tests in specially instrumented vehicles. Before any design is approved for production, it must pass the most exacting terrain and climatic tests. This testing and proving is available to help solve your braking problems.

Q. What is the first step in bringing Bendix experience to bear on a braking problem?

A. Call, wire or write our Customer Applications Engineers at South Bend, Ind.

Q. Is there any obligation?

A. No. We will analyze your needs and make a recommendation without obligating you in any way.



Bendix PRODUCTS DIVISION **South Bend, IND.**

Circle 167 on Inquiry Card for more data



NEED HELP WITH A HOSE CLAMP PROBLEM?



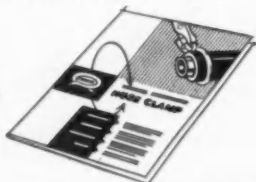
You can count on CORBIN!

Wherever you have a hose clamp problem — on your assembly line or in service — Corbin Hose Clamps will solve it! They are quality-made for trouble-free application and complaint-free service. Steels meet the industry's most rigid specifications and inspections. Quality control is continuous, thorough, exacting . . . including a testing of each load for plate thickness.

• • • and you get all this from CORBIN, too!

- ✓ **PROVEN PERFORMANCE** — Used by many leading manufacturers since first introduced
- ✓ **VOLUME SUPPLY** — Corbin is the world's leading hose clamp supplier — the safe source for volume users
- ✓ **SCHEDULED DELIVERIES** — Shipments systematically geared to your production schedule
- ✓ **RESERVE STOCKS** — Emergency needs are promptly met from continuously maintained reserves
- ✓ **ALL SIZES** — More standard sizes than any other maker

Write for Fact Folder HC20
and Size Specification Sheet



CORBIN HOSE CLAMP DIVISION
THE AMERICAN HARDWARE CORPORATION
NEW BRITAIN, CONNECTICUT

Circle 169 on Inquiry Card for more data

THIS PRODUCTION LINE IS FASTER, SAFER, WITH HEPPENSTALL TONGS



Being pushed upward into the locked-open Tongs, this engine block will trip a mechanism causing jaws to automatically close.

Air operated lifts are an integral part of the engine block balancers used at Chrysler Corporation's Trenton, Michigan plant. When balancing is completed, the lifts push the blocks upward into Heppenstall Tongs; jaws close automatically, and the block is on its way to the next work station. At the same time, another pair of Heppenstall Tongs is bringing in another block for balancing.

Seventy-five of these 500-lb. capacity Heppenstall Tongs are used to handle 6-cylinder engines of the new Plymouth, Dart and Valiant. Another seventy-five Heppenstall Tongs, slightly different in design, handle V-8 engines on conveyor lines of Dodge, DeSoto, Chrysler and Imperial.

Chances are Heppenstall Tongs can help you more quickly and safely move materials, semi-finished or finished products. For more information, call your Heppenstall Representative. Or, send us your load and operating requirements for a quotation.

HEPPENSTALL COMPANY

Pittsburgh 1, Pennsylvania

PLANTS: Pittsburgh and New Brighton, Pa. • Bridgeport, Conn.

MIDVALE-HEPPENSTALL COMPANY

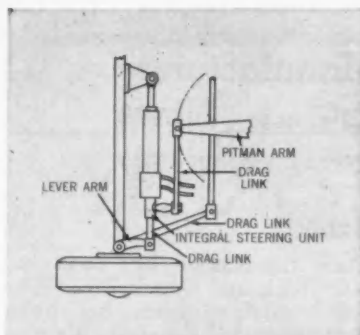
Nicetown, Philadelphia 40, Pa.

Die Blocks • Forgings • Back-Up Roll Sleeves • Rings • Industrial
Knives • Materials Handling Equipment • Pressure Vessels
Hardened and Ground Steel Rolls • Vacuum and Consumable
Electrode Melted Steels

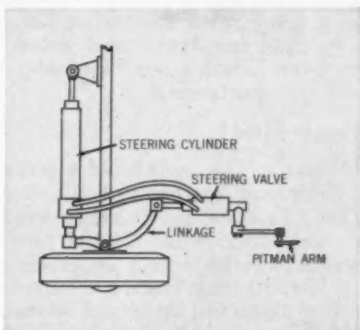
IF IT HANGS FROM A CRANE . . .
HEPPENSTALL CAN HANDLE IT

Circle 169 on Inquiry Card for more data

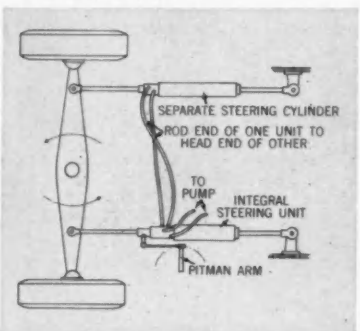




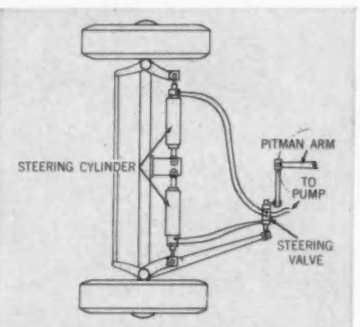
INTEGRAL LINKAGE system combines servo valve and steering cylinder with rod end fastened to frame and valve end to drag link.



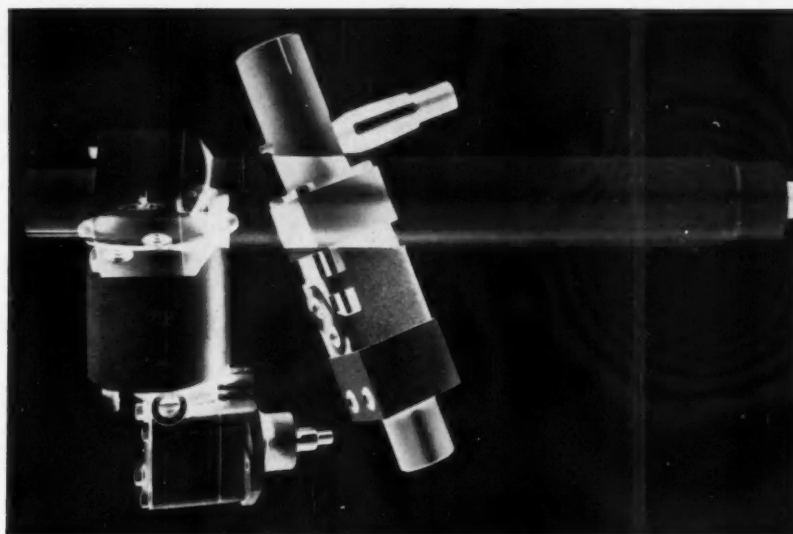
REMOTE LINKAGE system has separate servo valve and cylinder. Servo is mounted at most convenient point with cylinder located for maximum thrust.



COMBINED INTEGRAL-REMOTE system servo valve controls both cylinders. When integral unit (bottom) extends, remote unit (top) retracts.



REMOTE DUAL system uses one remote servo valve, offers best possible thrust conditions plus considerable installation flexibility.



FOR AXLE LOADINGS 1500-128,000 LBS.

New **VICKERS** power steering systems use standard units, offer custom performance

Performance benefits normally associated with custom designs plus the economy of standard, production-built components are combined in new Vickers power steering systems. The cylinder, servo valve, and pump-key elements in the power steering system are always perfectly matched to system needs because Vickers builds the complete system.

Either remote or integral systems can be provided for the complete range of axle loadings from 1,500 to 128,000 lbs. All vehicles use the same servo valve-holding engineering and installation time to a minimum and reducing inventory requirements for manufacturers building several sizes or types of equipment.

Operating Economy—Systems are designed for high pressure operation (to 2000 psi) permitting smaller pumps, lines, reservoirs, valves and cylinders to be used. Further economy results because each basic size of steering unit is capable of a wide range of axle loadings. This permits some manufacturers to use a single size of steering unit for their complete line of vehicles. For example, in a single cylinder installation, the Model SC-26 cylinder can be used for any axle loading from 16,000 to 64,000 lbs.

Further economy over the life of the system results from the minimum number of moving parts required by this design and from its rugged construction. All cylinders are double walled to eliminate the common hazard of functional damage to cylinder walls from flying

debris. Exclusive design vane pumps last longer, permit easy cold weather starting because pumping doesn't begin until after engine fires and comes up to speed.

Complete Responsibility—Both the equipment builder and ultimate user benefit because Vickers designs and builds all system components. In addition, a staff of power steering specialists is available to work with customers on specific development and application problems.

When equipment is being built for the export market, worldwide stocks and complete interchangeability of all parts made in Vickers plants throughout the free world offer added benefits.

More Data—Design advantages, dimensions, ratings, and other data are available in Bulletin titled "New Complete Power Steering Systems." Write for this 20 page Bulletin M5110.

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Mobile Hydraulics Division

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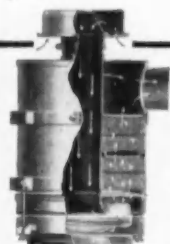
Bernoulli's Principle: "The pressure of a fluid, either liquid or gas, decreases as velocity increases and increases as velocity decreases."

Daniel Bernoulli (1700-1782)

For more than 35 years, Air-Maze has specialized in the filtration of liquids and gases. And although Bernoulli lived more than 200 years ago, our engineers must take into account his discoveries in designing and developing new products for industry.

From crawler tractors to jet aircraft... from gear cases to modern air-conditioned buildings, Air-Maze filters are keeping equipment running better and longer by keeping it clean and free from damaging contaminants.

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Manufacturers' News

(Continued from page 113)

GMC Truck Reliability

A product reliability department has been established in the GMC Truck and Coach Div. Sheldon G. Little, assistant chief engineer, has been named to head the department. Calvin J. Werner, division general manager, said "Organization of a product reliability department with plant-wide and product-wide responsibilities emphasizes our determination to design, manufacture and sell the best trucks and coaches in the business." Assisting Little will be C. C. Hursey, chief inspector, and Robert C. Kennedy, who has been product reliability engineer for the engineering department.

Ford to Build Glass Plant

Ford Motor Co. of Canada, Ltd., will build a glass fabrication plant in Crowland Township, southwest of Niagara Falls, Ont. The site is 50 miles from Ford's Oakville, Ont., assembly plant. Cost of land, building and equipment will be about \$6 million. Ford of Canada now obtains its glass from outside sources in Canada. The plant will be on a 200-acre site and will have 116,000 sq ft area, of which 18,000 ft will be office space. Operation is scheduled for August, 1961.

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Construction Equipment

(Continued from page 122)

neering has resulted in the use of an adjustable foam rubber seat positioned in center of the tractor. Two simple controls actuate the scraper.

WORTHINGTON'S "Blue Brute" portable rotary compressors feature "over-under" design. The first stage compressor is located directly over the second stage. The outboard end of each cylinder is exposed making the compressor easily accessible. The unit features a clutch which allows the engine to be warmed up without engaging the compressor. Self-draining cylinders eliminate oil accumulation and possible compressor blade damage. Two stage oil separation has one lifetime filter and one inexpensive throw-away filter.

HUBER-WARCO tandem rollers couple a torque converter, tail shaft governor and two-speed transmission. Within close limits, the governor automatically maintains the rolling speed set by the operator, regardless of the grade. A completely adjustable guide roll assembly eliminates road "scuff" caused by looseness. With less than two inches between the edge of the drive roll and the outside of the frame, the danger of curbing the roll is eliminated. Driver can see the edge of the compression roll from edge of the seat. Simplified dual controls and variable speed hydraulic steering are also featured. ■

New Performance Testing

(Continued from page 82)

him how and where to drive and can also warn him if the meters show that any particular part is nearing breaking point and thus avert disaster.

With this system car designers can get, for the first time, a continuous picture of performance from many more sources and many, many times faster than at present.

One of the advantages of the equipment is that if used at the same time on three different prototype vehicles, results of their behaviour in exactly similar conditions can be obtained almost instantaneously. ■

Induction Hardening Axle Shafts

(Continued from page 130)

coil head while it traverses the shaft. A cam rack at the top of the machine maintains positive control of scanning, heating, and quenching cycles. Cams are readily adjusted to control hardness and depth of pattern for various axle cross sections.

Specifications call for an average effective hardness of 50 RC at a minimum depth of 0.275 in. This requires a hardened depth of about 0.500 in. Following hardening the shafts are placed on an overhead conveyor for transport through a tempering furnace held at 350 F.

A summary of the advantages of the induction hardening process described above is listed as follows, according to Harvester:

1. Normal endurance limit increased from 25,000-psi in shear (for conventional heat treatment) to 65,000-psi with the new method. Under overload conditions, the finite life of the shaft has been increased 16 times that of the regular production shaft at 90,000-psi shear stress.
2. Maximum overload capacity at point of failure has been increased as much as 35-40 per cent.
3. At maximum overload, the induction hardened shaft fractures cleanly. Formerly shafts had a tendency to splinter longitudinally, often fanning out, making them difficult to remove. Also, fragments of the splintered shaft sometimes remained in the differential, requiring complete tear-down.
4. Costs are reduced due to using less expensive material and eliminating cold straightening. ■

Corvair Assembly

(Continued from page 69)

body begins to move along the fourth section of the final assembly line, it meets its front and rear suspension systems, the engine, transaxle and transmission.

These sub-assemblies are lifted

up to the car body and secured to it.

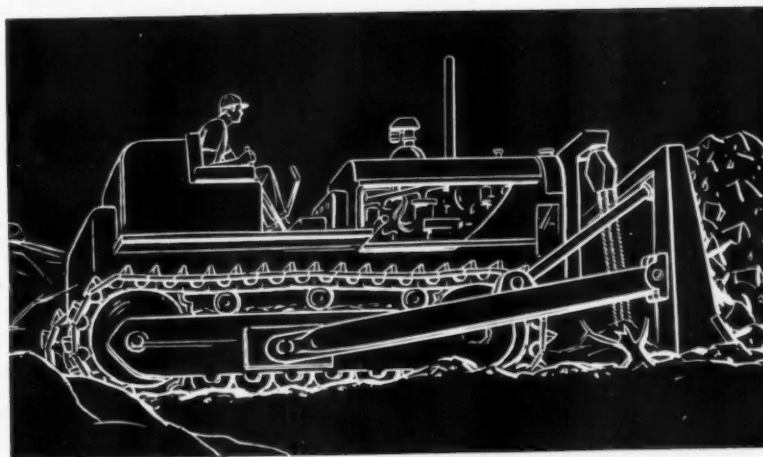
As the car proceeds to the fifth main section of the assembly line it is fitted with wheels, battery and steering wheel, among other parts.

When the car enters the final section of the assembly line it is lowered to a floor-level conveyor.

On the final section of the assembly line the car is subjected to a series of inspections and adjustments, after which the engine is

started and the car is driven off under its own power.

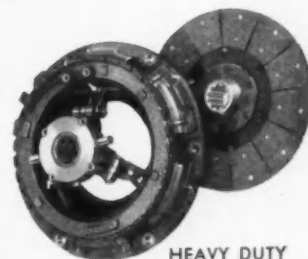
The first trip the car takes is to another inspection area. There the car stops on a set of rollers under its wheels for checking the performance of the automobile under road conditions. Steering, engine, transmission, and other components are tested. At the same time the car is tested for loose connections or rattles. Any needed adjustments are made promptly. ■



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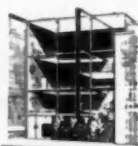
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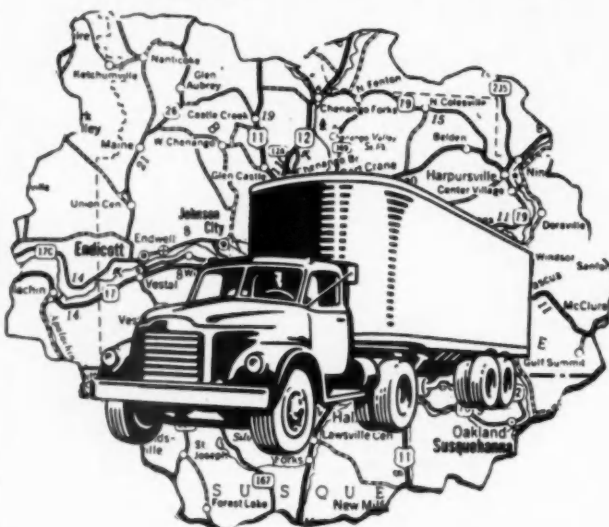
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By C. J. Kelly
ASSISTANT EDITOR

AI Index

1

The newest AUTOMOTIVE INDUSTRIES INDEX is ready for distribution. The INDEX is a handy reference to all feature articles and editorial subjects that have appeared in the magazine during the period of January 1 to June 15. Circle number one on the postcard for your copy.

Disc Grinders

2

A new 8-page condensed catalog illustrates and describes the company's line of high production precision Disc Grinders. Both horizontal and vertical machines are shown, with dimensions and specifications listed for each model. Featured in the new catalog is the DH 4 double horizontal spindle disc grinder which has the Besly exclusive sealed spindle quill construction. *Besly-Welles Corp.*

Generating Systems

3

A new bulletin describes a complete line of engine-driven electrical generating systems in the range of 10 to 200 kilowatts. It includes illustrations, line drawings and charts. *Consolidated Diesel Electric Corp.*

Silicones

4

This interesting brochure contains pertinent information about the application of Silicones in the automotive industries. New concepts in research and development and newly found freedom in design is discussed in this compendium. Many illustrations are included to show the various areas where this material has been successfully applied. The use of Silicones has been divided into three separate sections. One for development, one for design and the final part covers production. *Dow Corning Corp.*

Sound Control

5

Increasing efficiency and productivity with "Sound Control" is now illustrated in a 12-page catalog. The catalog illustrates typical sound control applications with illustrated graphs showing reduction of noise in decibels, also reduction of noise distinguished by the human ear. There are charts showing flow rates and operating specifications, photographs and explanations on how "Sound Control" by relativity on Land, Sea and Air is obtained with a New Silencer. *Allied Witan Co., Inc.*

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Machine Data 6

A new 27 page brochure, illustrating and describing a line of 2-Roll vertical abrasive belt grinding and polishing machines is now available. This catalog covers in detail the complete line of Grinding and Polishing Machines. The catalog is illustrated with large fold out pages of the standard machines as well as several photographs concerning the details of each type of machine. *The Hill Acme Co.*

Reciprocating Pumps 7

Designed for quick reference by engineers, production and management personnel, this condensed catalog includes design and material specifications, dimension tables and a pump selection chart for a complete line of Reciprocating Pumps. *Aldrich Pump Co.*

Fixtures 8

A new 8-page catalog fully describes a complete line of work-holding fixtures for use in electronic assembly. This catalog has been designated the HF-560. *Flotron Industries, Inc.*

Rotary Tables 9

Illustrated data sheet describes Cincinnati Gilbert hand-revolving Airmist tables for use with horizontal boring mills and milling planers. Tables will index extra-heavy loads even when placed off center. A specification table is included. *The Cincinnati Gilbert Machine Tool Co.*

Hoists 10

Sketches in Bulletin B-1403-B show how two Magna-Hoists can be joined together to provide a longer magnetic field when necessary. The Bulletin illustrates how the 75-lb Magna-Hoist, measuring 8 by 15 by 3 in., lifts a 2000-lb metal piece to demonstrate its lifting power. *Dings Magnetic Separator Co.*

X-Ray Literature 11

A 20-page list of references spanning the years from 1930 to 1960, giving authors and publication names, article titles and publication dates for 376 papers on X-ray analysis subjects, is available gratis from *Philips Electronic Instruments.*

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Castings

12

A new, 16-page illustrated brochure outlines a recent plant expansion and modernization program. A sample variety of the thousands of standard malleable and pearlitic castings designed and produced by the firm is also shown. The production of high quality castings is described in a concise, step-by-step form. Using photographs and captions, the brochure covers all the production sequences. *Canton Malleable Iron Co.*

Magnifiers

13

New items have been added to a 14-page illustrated booklet, which lists over 65 individual models of magnifiers with powers from 2x to 20x. Specifications and prices are included for an extensive selection of round and rectangular readers, folding pocket magnifiers, watchmaker's loupes, surface comparators, enlarging focusing magnifiers, etc. *Bausch & Lomb, Inc.*

Dial Timer

14

A plug-in dial timer with exclusive safety and conversion features is described in Engineering Data Sheet #87. Several photographs and drawings illustrate the many advantages of this new design. Also described in this new literature is a Field Conversion Kit. This Kit enables all installed ATC Atcotrol timers to be converted to plug-in convenience. *Automatic Timing & Controls, Inc.*

Gear Data

15

Publication of a new 246-page gear and speed reducer catalog has been announced. The fully illustrated book contains complete information on sizes, ratings and specifications of a line of gears and speed reducers. Also contained are easy to understand engineering data on the proper selection of gears and reducers to meet specific job requirements. An entire section is devoted to the new HI-LINE series of fin and fan cooled speed reducers. More than a hundred other varieties ranging in capacity from small fractional to 25 hp are also covered. The catalog is specially indexed to permit fast, convenient location of specific products. *Ohio Gear Co.*

Tires and Wheels

16

A four-page brochure that lists tires and wheels for boat trailers has been published. It is available without charge to dealers, industrial designers and boat owners. The brochure gives recommended inflation pressures and load capacity of the more popular sizes of boat trailer tires in both four and six ply ratings. It also contains information and specifications on boat trailer wheels for the do-it-yourself trailer builder. *B. F. Goodrich.*

Production Catalog

17

Automation components and entire assembly machines for use in today's modern production requirements are pictured, and their special purposes explained clearly, in the new 46-page Catalog-60. Many models of PDC Automatic Geneva Motion Index Tables, Dial Assembly Presses, Rivet Spinners and Special Assembly Machines, along with Tooling and Automatic Feeds, are shown. *Precision Detroit Co.*

Wheel Dressing

18

This catalog shows tangential angle wheel dressers and parts that are related. An interesting feature of the new catalog is the explanation of the tangential angle and its origin. Other types of dressers are also included. *L. Newman.*

Connector Data

19

Connectors for every need are described in a colorful, 12-page brochure. Photos and diagrams are used to describe in detail all types of multi-contact connectors and their applications. *Consolidated Electrodynamics Corp. A Subsidiary of Bell & Howell.*

Spray Unit

20

A new sheet is available on a portable single spindle painting machine. It is completely air motivated and equipped with two automatic spray guns, controlled by an automatic timing device. Variable speed drive of the spindle is adjustable from 100 to 400 RPM. *Conforming Matrix Corp.*

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ASSISTANT EDITOR

Sheet Polishing 21

An illustrated 8 page catalog describes sheet polishing mills for finishing metal sheets, plates and coils. Also included are typical polishing mill case history applications and two color floor layouts of automated sheet polishing lines including the 343-ft long high production line installed at the Ford Motor Company to produce polished sheets for bumper stampings at minimum cost. *Acme Mfg. Co.*

Furnaces 24

New 12-page bulletin describes and illustrates electrically heated and fuel fired continuous chain belt conveyor furnaces for clean and scale-free hardening, non-decarb hardening, carbon restoration, carburizing, carbonitriding and other heat treatment of bolts, rivets, bearing races and a wide variety of other small and medium size parts. *The Electric Furnace Co.*

Machine Catalog 22

Bulletin S-21 describes the design, construction and operating features of the new model 10-6 opposed head precision boring machine, including complete specifications. Features of special interest covered in the Bulletin include descriptions of the two horizontal boring heads. *Pope Machinery Corp.*

Aluminum Jacketing 25

New four-page Insul-Coustic Bulletin ICB describes the company's Al-Cor-Jac and their complete line of aluminum products for protecting insulation on piping, tanks or towers. Photos of typical installations are included. Also included is a brief summary of other insulation accessory products manufactured by Insul-Coustic. *Insul-Coustic Corp.*

Press Brakes 23

A revised catalog on Steelweld Mechanical Press Brakes has just been completed. The 50 page highly illustrated book covers latest features and new models added to the Press line. The table on specifications has been greatly enlarged and covers machines from 160 to 1250 tons, mid-stroke capacity. *The Cleveland Crane & Engineering Co.*

New Items Catalog 26

A new 36-page catalog includes many new, patented piercing accessories as well as a complete line of shoulder punches, manufactured to A.S.T.M.E. standards, interchangeable ball seat punches, pilot punches and set screw punches. It includes charts, line drawings and technical information. *Pivot Punch and Die Corp.*

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Photo: Courtesy Stratos Division, Fairchild Engine and Airplane Corp.

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